U.S. DEPARTMENT OF COMMERCE
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PB-260 281

STATUS OF MUNICIPAL WASTE TREATMENT OF THE SOUTH PLATTE RIVER BASIN, COLORADO, 1964-1967

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
DENVER, COLORADO

DECEMBER 1967

PB 260 281

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STATUS OF MUNICIPAL WASTE TREATMENT OF THE SOUTH PLATTE RIVER BASIN, COLORADO, 1964-1967'

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STATUS OF MUNICIPAL WASTE TREATMENT IN THE SOUTH PLATTE RIVER BASIN, COLORADO, 1964-1967

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
South Platte River Basin Project

December 1967

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ACKNOWLEDGMENT

Throughout this study effective coordination was maintained with interested Federal, State, county, municipal, and district personnel. The Colorado State Department of Public Health furnished information concerning design, operation, and effluent data on various waste treatment plants in the Basin. The officials of the various municipalities and sanitation districts gave generously of their time and knowledge by furnishing operating records, laboratory results, and system maps. Operators provided assistance in the collection of samples where required. Officials of the Metropolitan Denver Sewage Disposal District No. 1 supplied detailed information concerning the current status of facilities in the Metropolitan Denver area. The generous assistance given by the personnel of these agencies and others participating in the study is gratefully acknowledged.

SUMMARY AND CONCLUSIONS

1. A study of municipal waste treatment facilities in the South Platte River Basin was conducted over the period from April 1964 to April 1967. Treatment systems operated by private organizations receiving domestic wastes from trailer courts, recreational facilities, food service establishments, etc. are included, in part, in this document. Undoubtedly additional sources of wastes are discharging to Basin streams that are not listed herein.

2. The current status of municipal waste treatment in the Metropolitan Denver area, previously reported in Project Report PR-3,[1] findings drawn from the 1965-67 survey of remaining municipal waste facilities in the Basin, and general comments pertinent to both are given in this document.

3. Data were obtained from: a) Project sampling and inspection programs; b) the files and officials of the Colorado State Department of Public Health; c) officials of the Metropolitan Denver Sewage Disposal District No. 1; and d) personnel of the municipal and local institutions.

4. Marked improvements in municipal pollution abatement have occurred over the past few years due to construction of new waste treatment facilities. However, the presence of secondary treatment facilities cannot be construed as evidence of satisfactory waste treatment. Many plants are not providing levels of treatment necessary to prevent degradation of the receiving stream and provide protection for the beneficial uses made of these waters.

5. Inadequate performance of many treatment facilities is attributed to poor planning, design, construction, operation, and maintenance, in addition to other factors. The chief factor is improper operational control. Some plants are overloaded and expansion is necessary; others require additional components.

6. Significant progress in municipal pollution abatement has been made in the Denver Metropolitan area. The Metropolitan Denver Sewage Disposal District No. 1 treatment plant, completed in late 1966, now serves most of the one million people in the area.

1/ Municipal Waste Report, Metropolitan Denver Area, South Platte River Basin, U. S. Public Health Service, South Platte River Basin Project, PR-3, Denver, Colorado, December 1965

7. More efficient and economical treatment of municipal wastes outside Metropolitan Denver could be accomplished by consolidation of the numerous separate entities similar to the Metropolitan Denver Sewage Disposal District No. 1 concept.

8. Use of unlined waste stabilization ponds has created a serious potential for ground-water contamination.

9. The use of septic tanks in heavily populated areas must be discouraged to prevent the pollution of ground water.

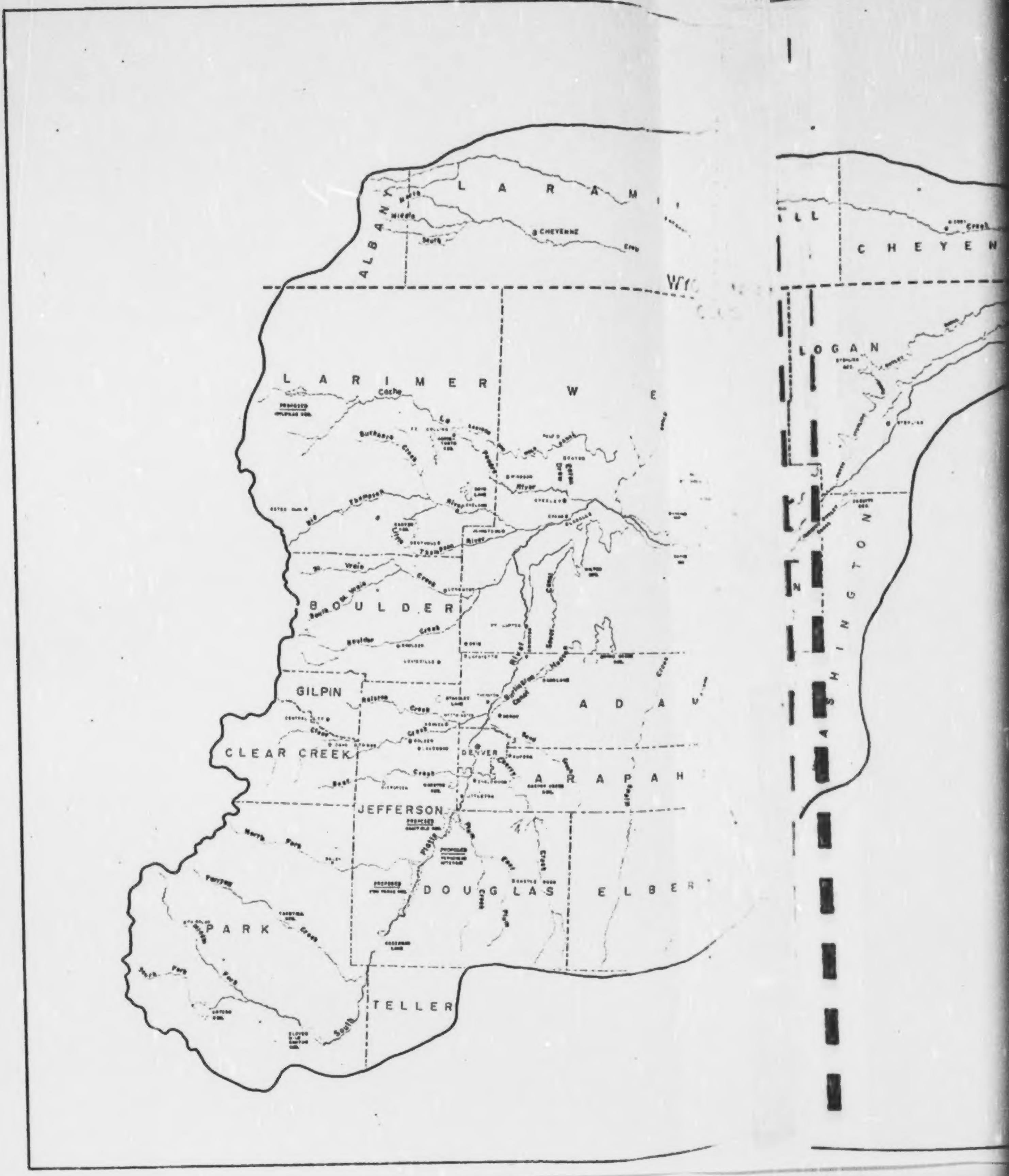
INTRODUCTION

The status of municipal waste treatment facilities in the South Platte River Basin is based upon studies conducted by the South Platte River Basin Project over the period of 1964-1967. Objectives of the study are to determine sources of municipal waste discharges, quality of effluent, and general status of the communities relative to needs. The study was undertaken as part of the overall Project plan to assess waste loads, develop water quality objectives, and undertake a pollution abatement program in cooperation with the Colorado State Department of Public Health. Information was obtained from several sources, including the report on the 1964 conditions in the Metropolitan Denver area.

Recommendations on municipal waste treatment and abatement in the Metropolitan Denver area were made at the Second Session of the Conference in the matter of Pollution of the South Platte River Basin in the State of Colorado on April 27-28, 1966.1/ These recommendations helped to provide the stimulus for many improvements in municipal waste treatment over the area.

Section A of this report gives information on the status of waste treatment facilities in the Metropolitan Denver area subsequent to 1964. Section B consists of individual reports for systems in the remainder of the Basin. Section C contains a listing of communities: 1) served totally by the Metropolitan Denver Sewage Disposal District No. 1; 2) treating a portion of their wastes, discharging the remainder to the facilities of MDSDD#1; 3) served by other sanitation districts; and 4) served by individual facilities such as septic tanks, cesspools, etc.

1/ Proceedings, Volumes I, II, and III, of the Conference in the matter of Pollution of the South Platte River Basin in the State of Colorado, Second Session, Denver, Colorado, April 27-28, 1966, U. S. Department of the Interior, Federal Water Pollution Control Administration, Washington, D. C.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Middle
South
CHEYENNE
Crow
WYO
LARIMER
Cache
La
Poudre
River
PROPOSED
Buckhorn Creek
Big Thompson
River
Little Thompson
River
WE
LL
CHEYEN
LOGAN
St. Vrain Creek
South St. Vrain
BOULDER
Boulder Creek
GILPIN
Ralston Creek
Clear Creek
CLEAR CREEK
DENVER
Bear Creek
JEFFERSON
PROPOSED
Burlington Canal
Sand
ADA
Cherry
ARAPAH
North Fork
Tarryall
Creek
PARK
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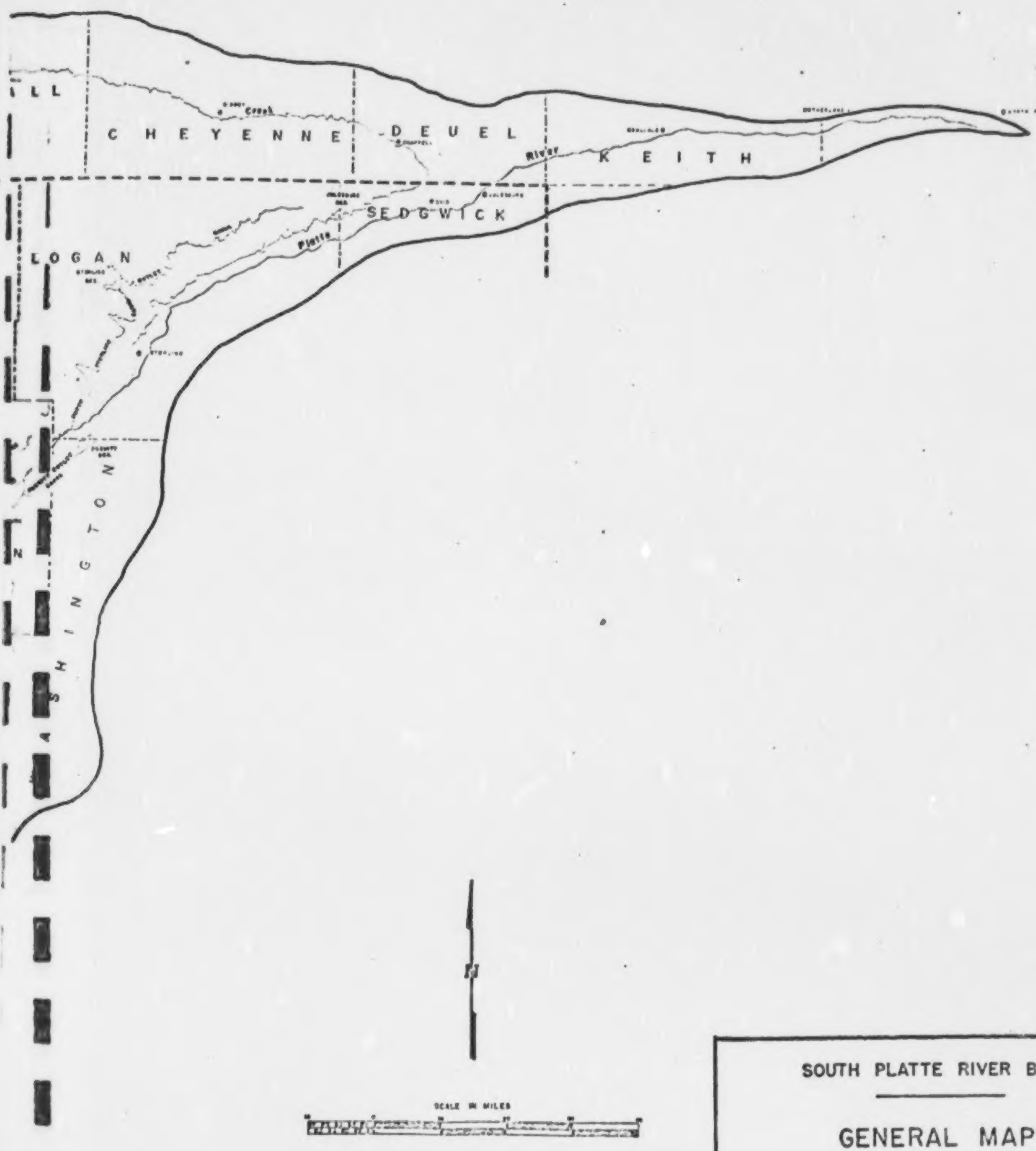

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CHEYENNE
DEUEL
KEITH
SEDGWICK
LOGAN
SHINGTON
Creek
River
Platte
N
SCALE IN MILES

FEBRUARY 1964
REVISED MARCH 1966
REVISED AUGUST 1966

SOUTH PLATTE RIVER BASIN

GENERAL MAP

U.S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
Denver, Colorado

FIGURE 1

DESCRIPTION

Study Area

The South Platte River originates on the east side of the Continental Divide in central Colorado, flows northeast across the State of Colorado into Nebraska where it joins the North Platte River to form the Platte River, a tributary of the Missouri River. Its total drainage area is approximately 24,300 square miles, of which 19,450 square miles are within the State of Colorado. Principal tributaries to the South Platte River within the State of Colorado are the North, Middle, and South Forks of the South Platte River, Bear Creek, Cherry Creek, Clear Creek, St. Vrain Creek, the Big Thompson River, and the Cache la Poudre River. A general map of the Basin is given in Figure 1. Estimated 1967 population of the Basin within the State of Colorado is 1,312,000, with about 1 million persons residing in the Metropolitan Denver area.

The principal water uses in the South Platte River Basin are agricultural irrigation, municipal and industrial water supply, and various forms of recreation. At the present time, waste assimilation is an important, although not desirable, in-stream use. When water quality is improved, the Basin waterways will be used to a much greater extent for municipal water supply, recreation, including a warm-water fishery, wildlife preservation, and aesthetic enjoyment.

Type and Location of Treatment Facilities

This report covers 107 [1] active municipal waste treatment facilities. Forty-two are operated by sanitation districts, 35 by municipalities, 21 by private organizations, 6 by Federal agencies, 2 by schools, and 1 by a State agency. Tables I, II, and III list the treatment plants, giving a map identification number for each. Their respective locations are shown on Figures 2, 3, and 4.

The study showed that 29 treatment systems are not discharging to surface streams. The entire effluent from four plants in the Denver area is directed to the Metropolitan Denver Sewage Disposal District No. 1 plant for further treatment. Of the 73 treatment systems releasing effluent to streams, 12 discharge directly or indirectly to the South Platte River; 12 to the Big Thompson River (and its tributaries); 11 to Clear Creek; 8 to the Cache la Poudre River; 8 to St. Vrain Creek; 5 to Bear Creek; 4 to Sand Creek, and 13 to other waterways and irrigation canals tributary to Basin streams.

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[1] This total figure includes the recently abandoned treatment works of the City of Thornton; wastes are presently treated at the MDSDD#1 facility. This figure also includes the recently completed treatment system for the community of Kittredge not shown in Table I or Figure 2.

TABLE I

MUNICIPAL WASTE TREATMENT FACILITIES
UPPER SOUTH PLATTE RIVER BASIN
AUGUST 1967

Map Identification Number	Entity
1	Geneva Basin Ski Area
2	Castle Rock
3	Silver Heights Water and Sanitation District
4	Continental Divide Race Track
5	Louviers Water, Sanitation, and Fire District
6	Littleton
7	Evergreen
8	West Jefferson County Sanitation District
9	Webb Trailer Court
10	Mountain Valley Trailer Court
11	West Jefferson School
12	Englewood
13	South Lakewood Sanitation District
14	Runyan Subdivision Sanitation District
15	Parker Heights Water and Sanitation District
16	Cherry Creek Reservoir Recreation Area
17	Glendale
18	City and County of Denver - Northside Plant
19	Rocky Mountain Arsenal
20	Metropolitan Denver Sewage Disposal District No. 1
21	Buckley Air National Guard Base
22	East Cherry Creek Valley Water and Sanitation District
23	Fitzsimons General Hospital
24	Aurora - Sand Creek Plant
25	Aurora - Westerly Creek Plant
26	Loveland Basin Ski Area
27	Loveland Valley Ski Area
28	Berthoud Pass Lodge
29	Idaho Springs
30	El Rancho Restaurant
31	Mount Vernon Country Club
32	Golden (Adolph Coors Company)
33	Northwest Lakewood Sanitation District
34	Fruitdale Sanitation District
35	Wheatridge Sanitation District
36	Clear Creek Valley Water and Sanitation District
37	Arvada
38	Sheridan Mobile Park
39	Modern City Trailer Court

Table I (continued)
Municipal Waste Treatment Facilities
Upper South Platte River Basin
August 1967

Map Identification Number	Entity
40	Westminster Sanitation District
41	Baker Water and Sanitation District
42	North Washington Water and Sanitation District
43	Thornton - See Footnote 1/, page 2
44	South Adams Water and Sanitation District
45	Hi-Land Acres Water and Sanitation District
46	Brighton
47	Standley Lake Water and Sanitation District
48	Broomfield
49	Lake Eldora Ski Area
50	Price's Mesa Manor Trailer Court
51	Louisville Sanitation District
52	Lafayette
53	Bennett Sanitation District
54	Strasburg Sanitation District
55	Byers Sanitation District
56	Deertrail

TABLE II

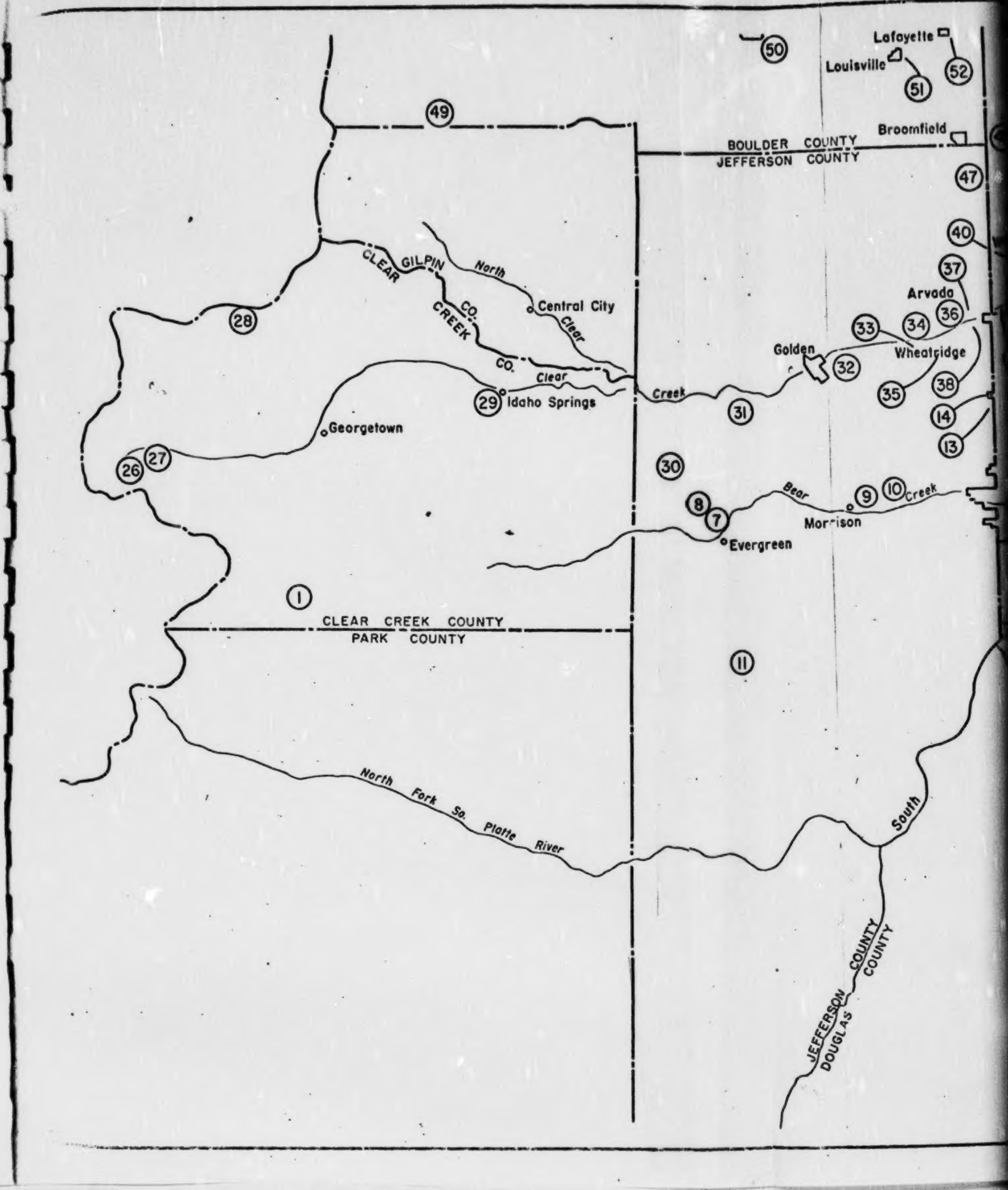
MUNICIPAL WASTE TREATMENT FACILITIES
MIDDLE SOUTH PLATTE RIVER BASIN
AUGUST 1967

Map Identification Number	Entity
57	Hudson Sanitation District
58	Fort Lupton
59	Platteville
60	Long's Peak Campground
61	Lyons Sanitation District
62	Longmont
63	Lake Valley Estates Water and Sanitation District
64	Gunbarrel Estates Water and Sanitation District
65	Boulder
66	Tri-Area Sanitation District
67	Erie Sanitation District
68	Mead Sanitation District
69	Gilcrest Sanitation District
70	YMCA Conference Camp
71	U. S. National Park Service Housing and Utility Area
72	Fall River Pass Lodge
73	Aspenglen Campground
74	National Park Village
75	Thunder Mountain Lodge
76	Hidden Valley Ski Area
77	Estes Park Sanitation District
78	Estes Park Reclamation Subdivision Sanitation District
79	Eden Valley Institute
80	Loveland
81	Johnson's Corner Cafe and Motel
82	Berthoud
83	Johnstown
84	Hill-N-Park Sanitation District
85	LaSalle
86	Evans
87	LaPorte School
88	North College Avenue Sanitation District
89	Fort Collins
90	Wellington
91	Boxelder Sanitation District
92	South Fort Collins Sanitation District
93	Windsor
94	Eaton
95	Greeley
96	Ault Sanitation District
97	Kersey
98	Keenesburg Sanitation District

TABLE III

MUNICIPAL WASTE TREATMENT FACILITIES
LOWER SOUTH PLATTE RIVER BASIN
AUGUST 1967

Map Identification Number	Entity
99	Log Lane Village Sanitation District
100	Fort Morgan
101	Brush
102	Merino
103	Sterling
104	Peetz Sanitation District
105	Crook Sanitation District
106	Julesburg



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GILPIN
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CREEK
CO.
Central City
Clear
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Golden
32
Wheatridge
38
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Clear
Creek
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Idaho Springs
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14
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Georgetown
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Bear
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CLEAR CREEK COUNTY
PARK COUNTY
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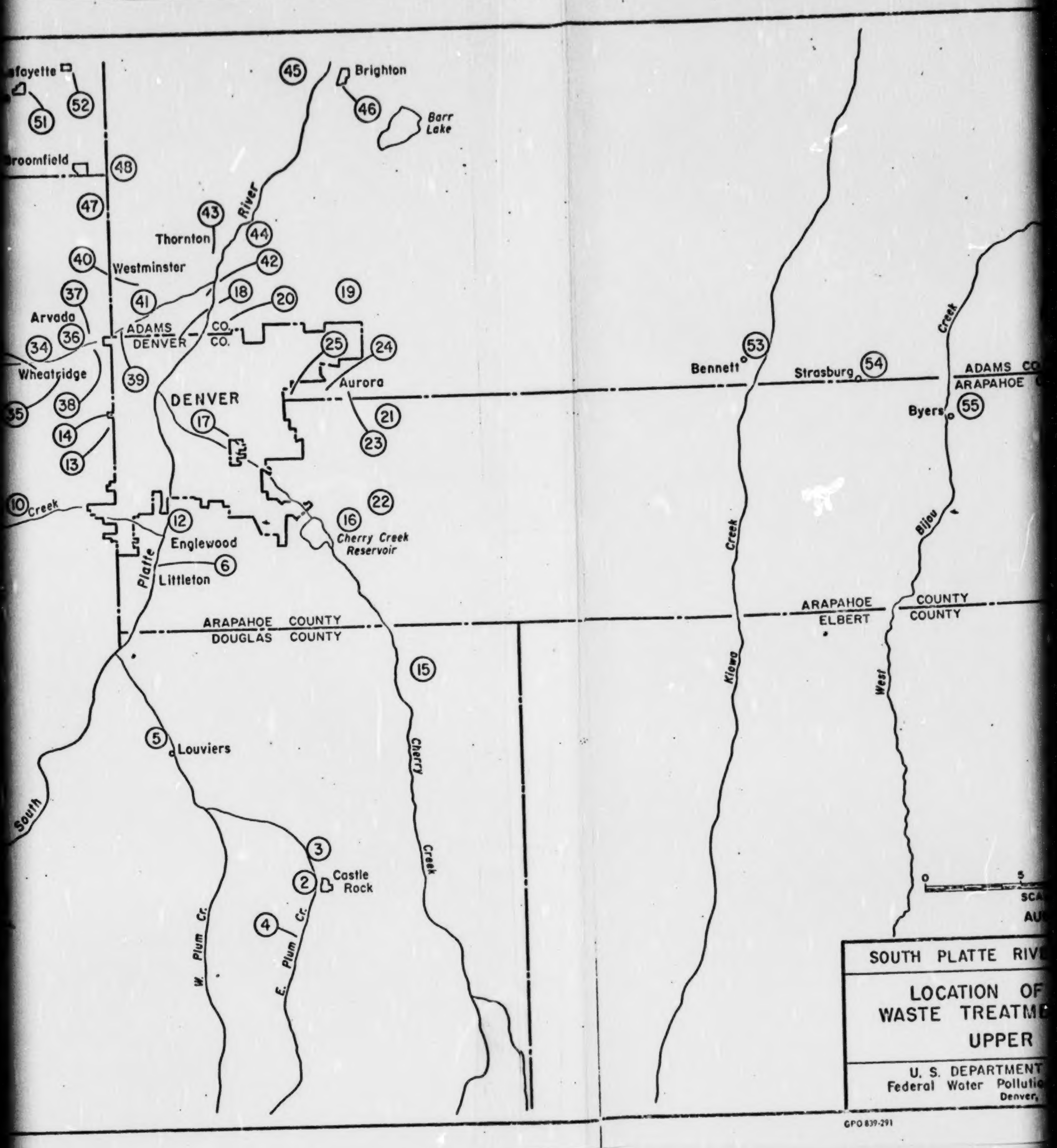
North Fork So. Platte River
South
JEFFERSON COUNTY
DOUGLAS COUNTY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DENVER CO.
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Englewood
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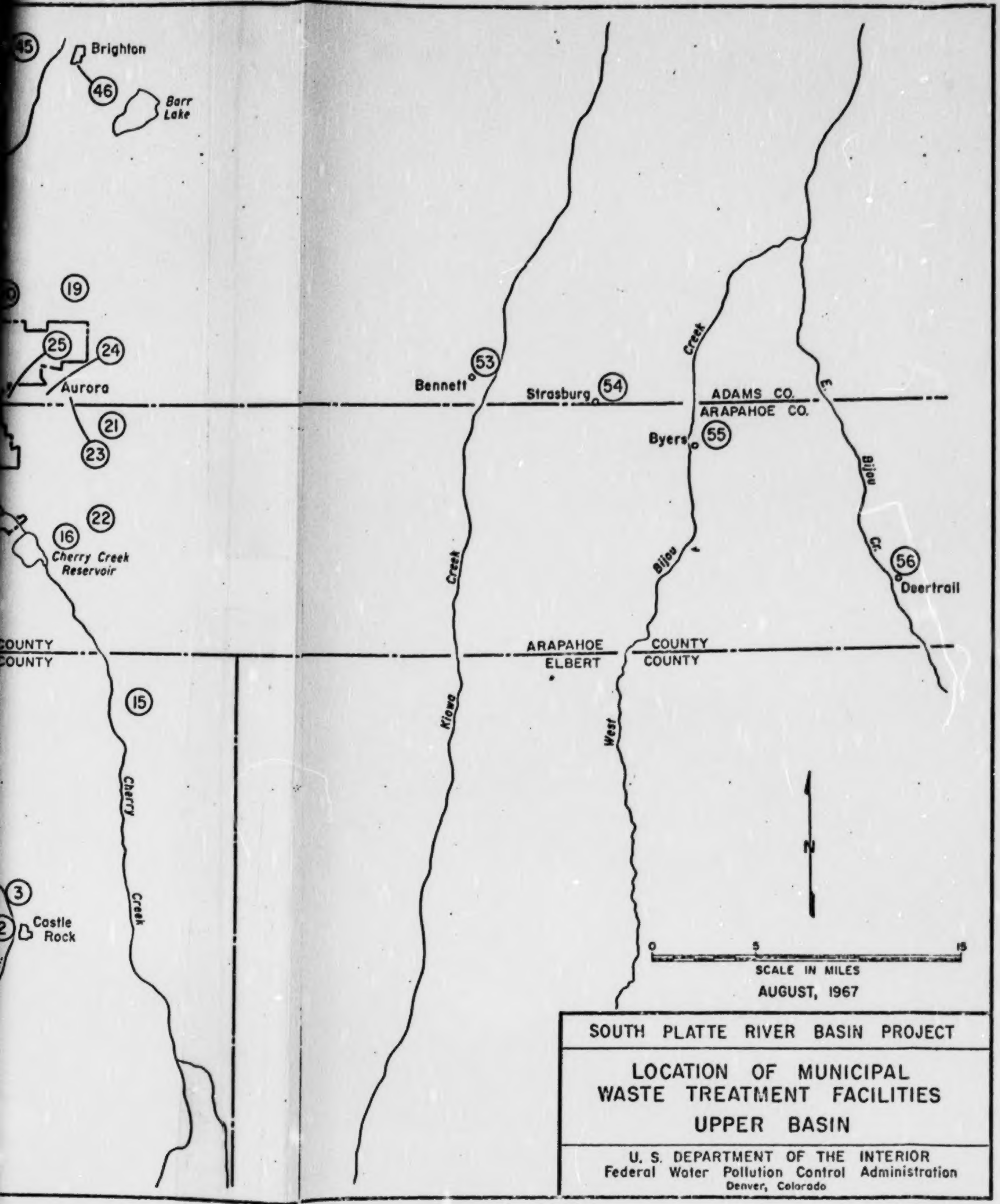
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SCALE IN MILES

AUGUST, 1967

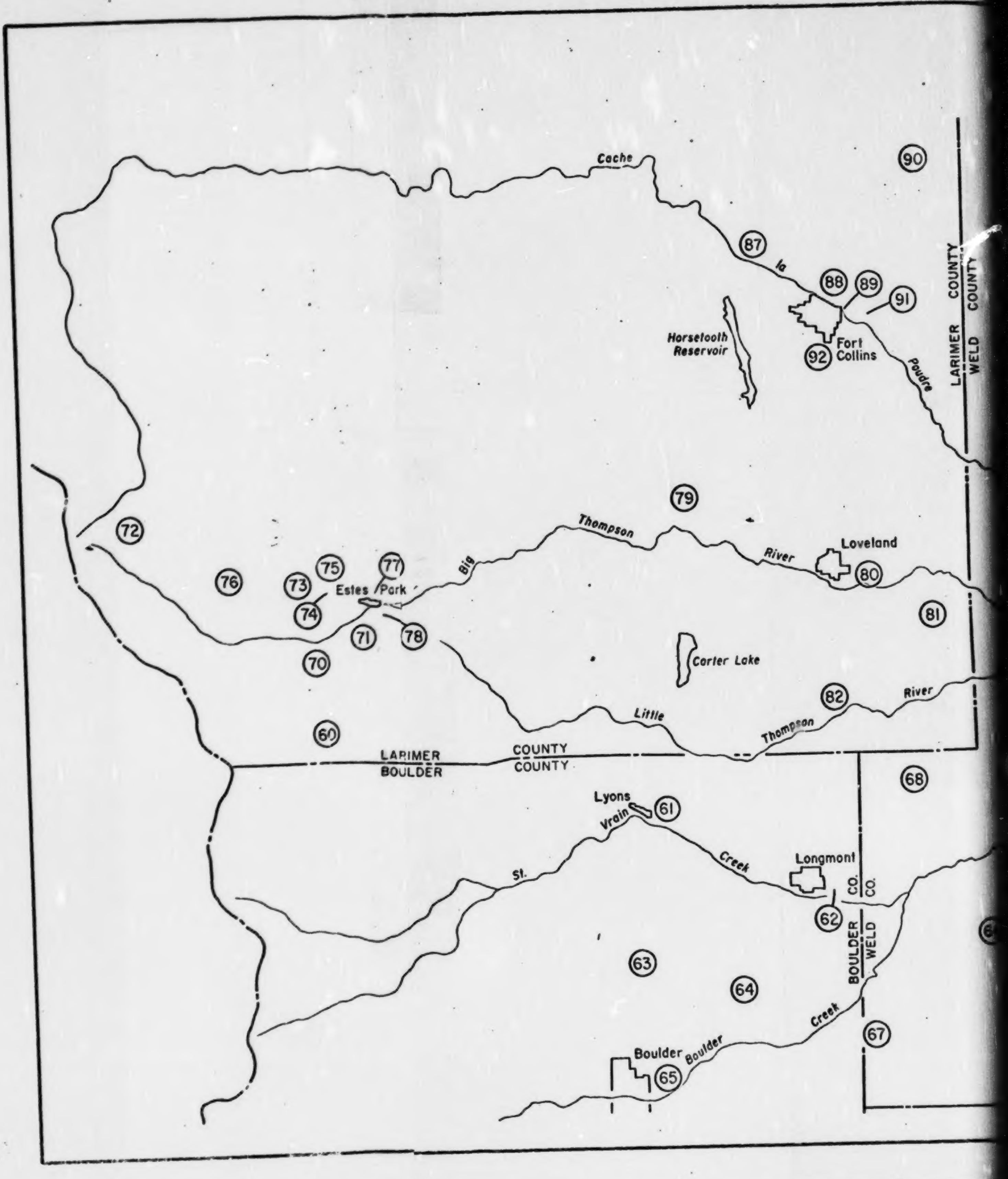
SOUTH PLATTE RIVER BASIN PROJECT

LOCATION OF MUNICIPAL WASTE TREATMENT FACILITIES UPPER BASIN

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
Denver, Colorado

GPO 839-291

FIGURE 2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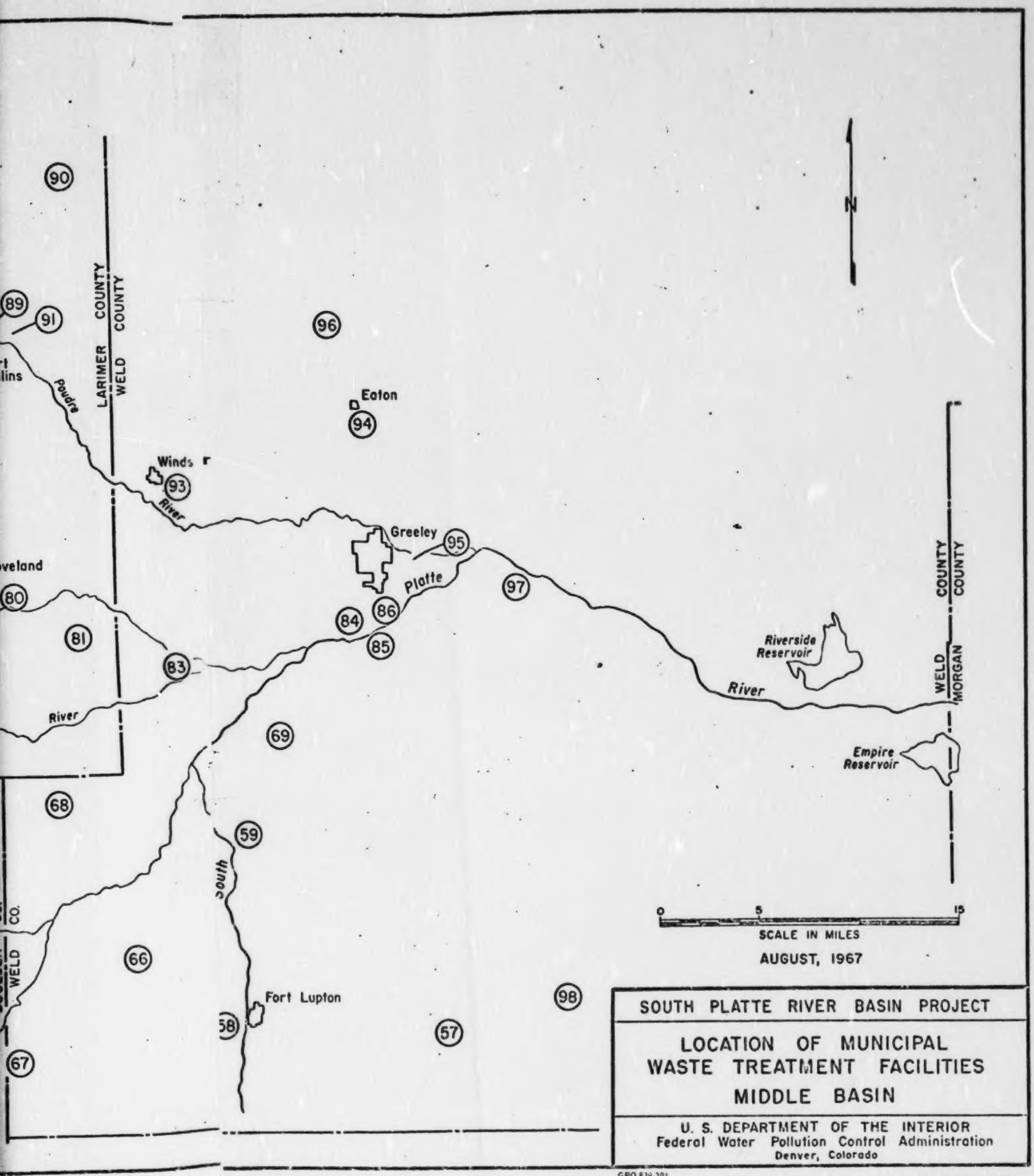
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SCALE IN MILES
AUGUST, 1967

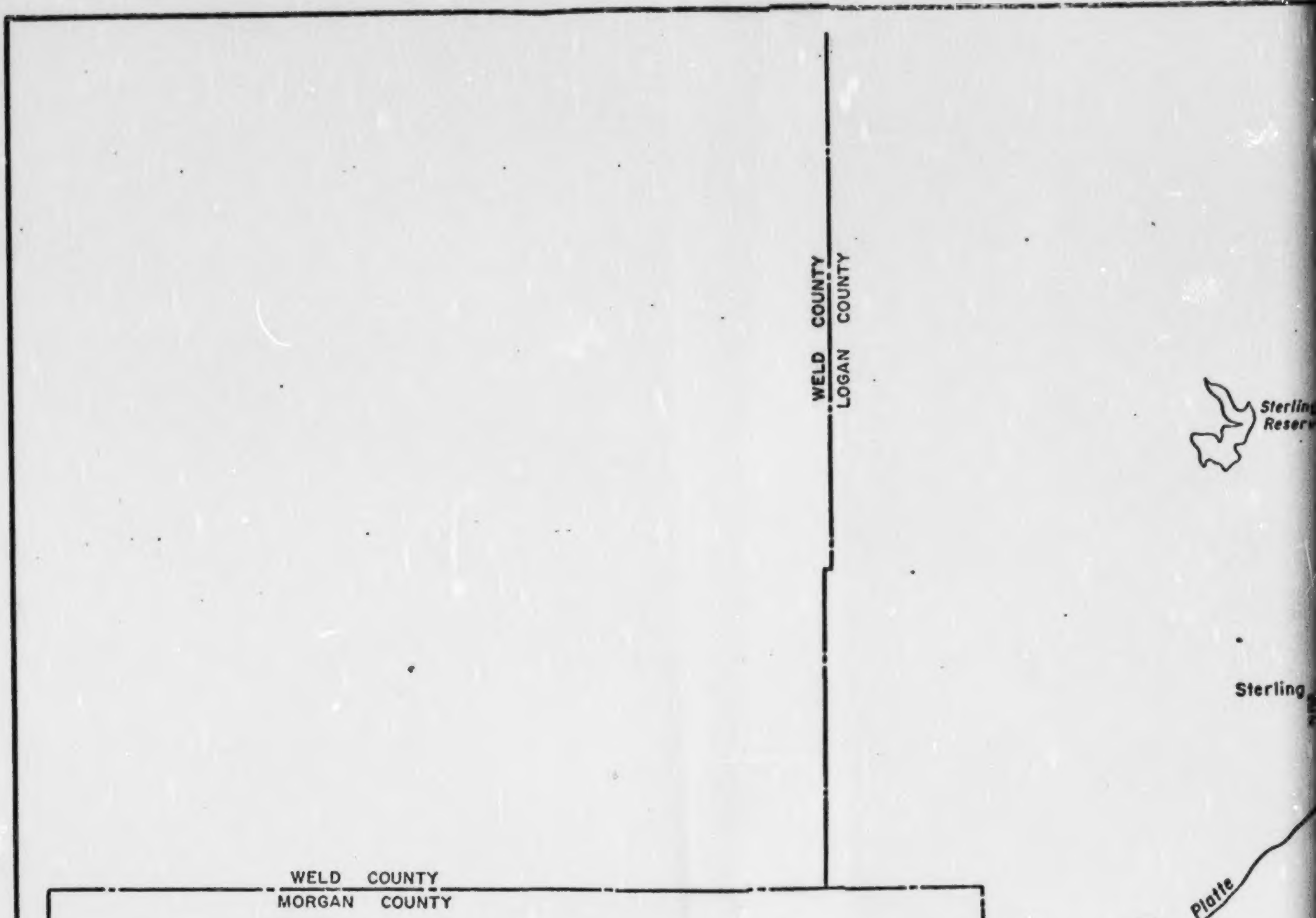
SOUTH PLATTE RIVER BASIN PROJECT

LOCATION OF MUNICIPAL
WASTE TREATMENT FACILITIES
MIDDLE BASIN

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
Denver, Colorado

GPO 839-291

FIGURE 3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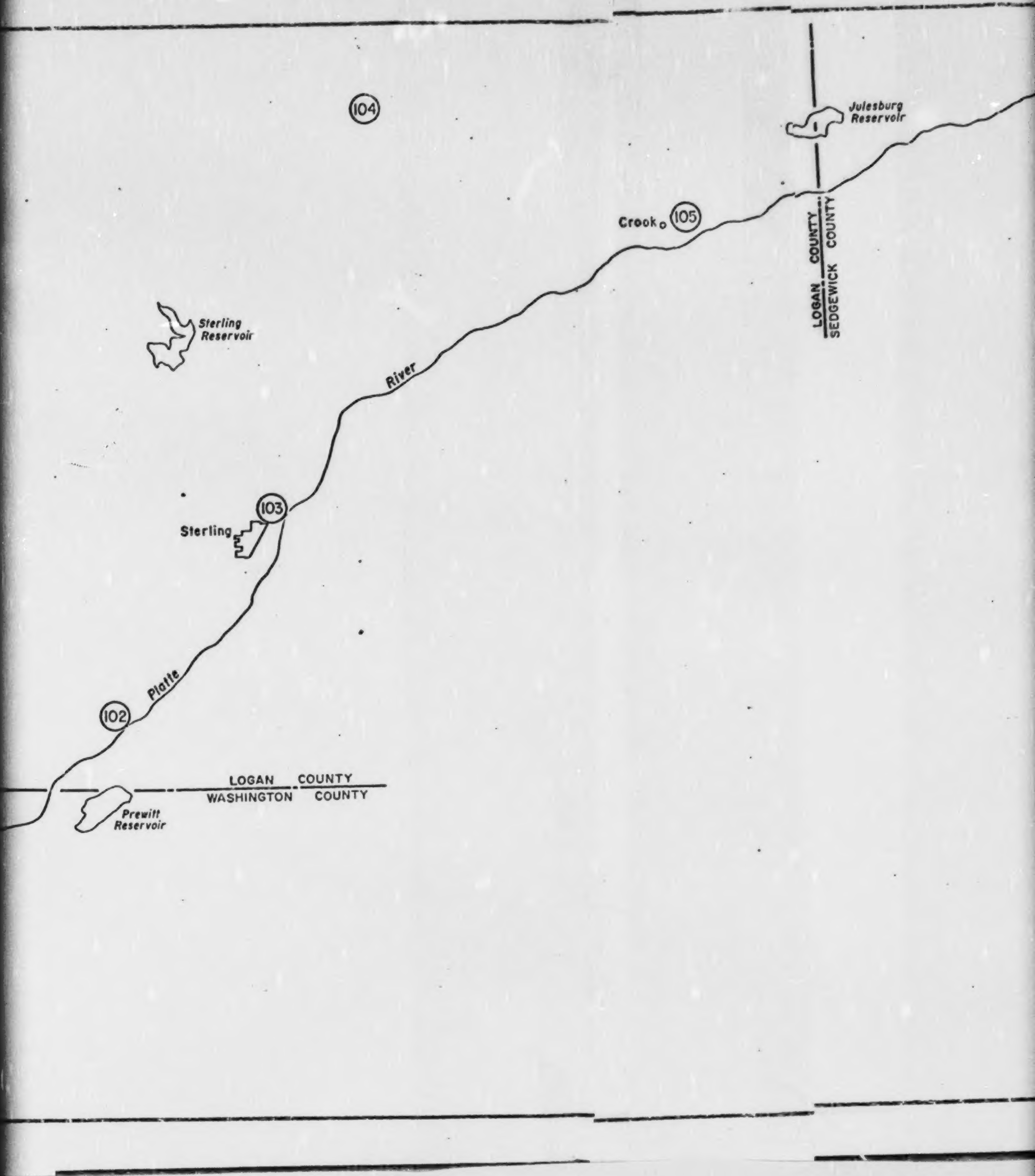
Fort Morgan
Wiggins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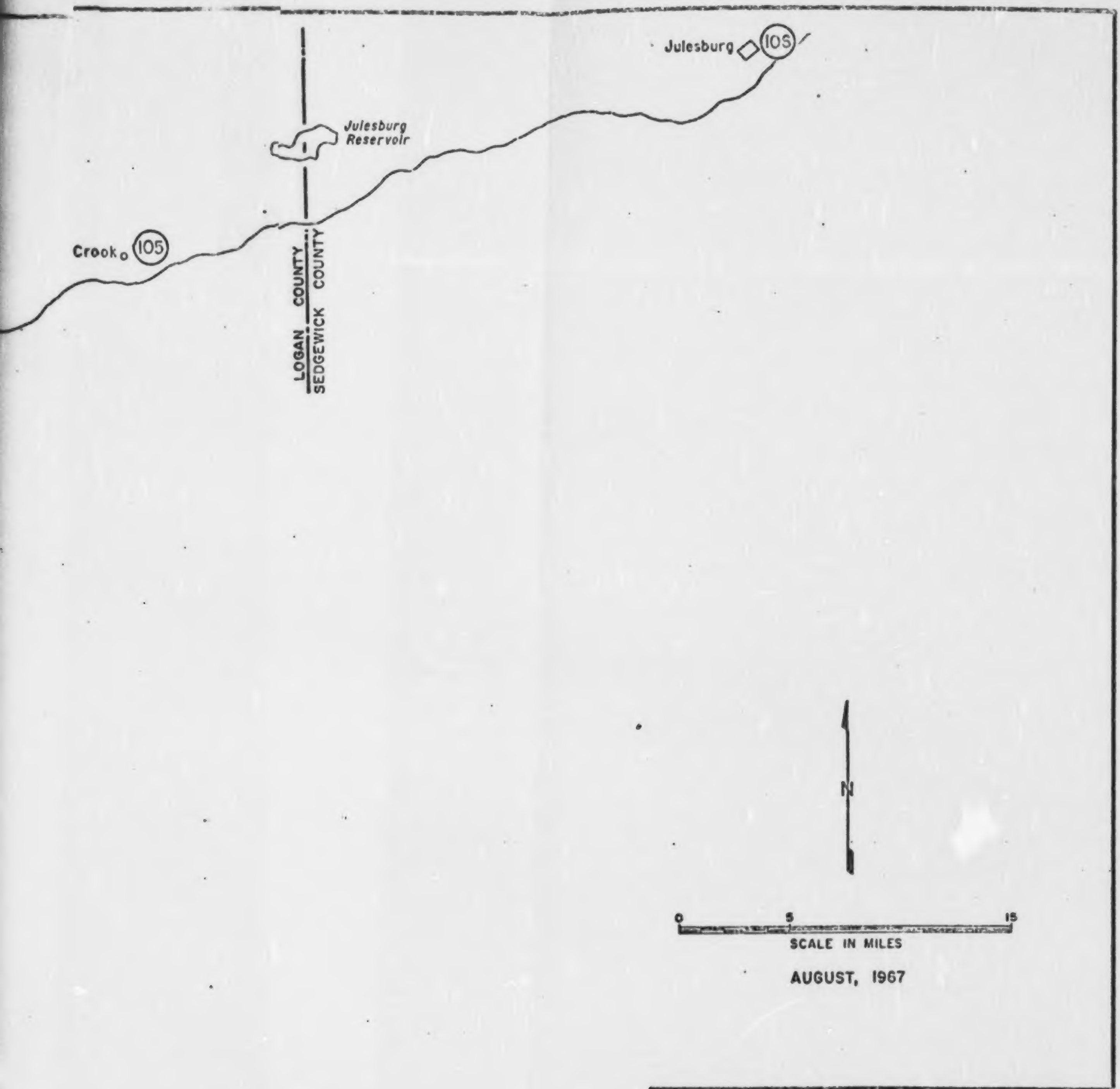
Prewitt Reservoir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SCALE IN MILES
AUGUST, 1967

SOUTH PLATTE RIVER BASIN PROJECT

LOCATION OF MUNICIPAL
WASTE TREATMENT FACILITIES
LOWER BASIN

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
Denver, Colorado

GPO 839-291

FIGURE 4

The above treatment facilities served approximately 1,180,000 persons on a permanent basis, or about 90 percent of the total Basin population.

Municipal Waste Discharge

Included in the category of municipal waste treatment facilities are those operated by cities and towns, sanitation districts, Federal and State agencies, and private organizations. The quality of effluent discharged by these installations varied significantly depending upon the strength and volume of the particular waste treated and degree of treatment provided. In addition to domestic wastes, a number of plants received significant amounts of industrial wastes.

Present State Laws on Waste Discharges

The General Assembly of the State of Colorado in its 1966 Session enacted "The Colorado Water Pollution Control Act of 1966" [1] which was signed into law by the Governor on March 9, 1966. The Act provided, among other things, for: 1) the creation of a State Water Pollution Control Commission as a Division of the State Department of Public Health; 2) the establishment of water quality standards, and other provisions to prevent, abate, and control the pollution of the waters of the State.

Proposed water quality standards for the streams of the State were prepared by the Commission and submitted in June 1967 to the Federal Water Pollution Control Administration for review. After final approval is given by the Secretary of the Interior, these standards will become the Federal Standards on interstate waters. The Commission has also been assigned responsibility for surveillance of waters of the State to determine quality and locate sources of pollution if the quality does not meet the standards.

The Act further established the powers and duties of the Commission to include: 1) "Upon request, to examine and approve or disapprove plans and specifications for the construction and operation by a political subdivision of: (i) new sewerage systems, disposal systems, and treatment works; and (ii) extensions, modifications of, or addition to new or existing sewerage systems, disposal systems, or treatment works; 2) to take such action in accordance with rules and orders . . . . . as may be necessary to prevent, abate, and control pollution."

1/ Colorado Water Pollution Control Act of 1966, Senate Bill No. 2, State of Colorado, Denver, Colorado, signed March 9, 1966

CONDUCT OF THE SURVEY

Waste treatment facilities in the Metropolitan Denver area were investigated by Project staff in 1964 and subsequently reported upon in 1965. In some cases additional sampling and analyses of plant effluents were conducted by the Project. Evaluation and data given in this report were derived from: 1) Project sampling and inspection programs; 2) the files and officials of the Colorado State Department of Public Health; and 3) personnel of the municipal and local institutions. Installations over the remainder of the Basin were evaluated by Project engineers as to the manner of operation and condition of the treatment system. No attempt was made to locate individual systems discharging to Basin streams.

The sampling program varied from the collection of composite and grab samples daily for a period of 5 days down to the collection of a single grab sample. Samples were analyzed at the Project laboratory in accordance with "Standard Methods for the Examination of Water and Wastewater." [1] Tabulation of analytical results is included with the individual reports contained in Sections A and B.

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[1] Standard Methods for the Examination of Water and Wastewater, Twelfth Edition, APHA, AWWA, WPCF, New York, N. Y., 1965

DISCUSSION

Damage to Water Quality

The discharge of untreated and inadequately treated municipal and industrial wastes has caused serious damage to the waters of the South Platte River. Project findings have shown that: 1) coliform densities greatly exceed all commonly accepted standards for recreational use in many reaches of the South Platte River and its tributaries and presents a health hazard to those persons coming in contact with the waters; 2) oxygen demanding wastes have caused low dissolved oxygen levels in many reaches of the South Platte River below Denver and certain tributaries, causing near septic conditions in the stream; 3) suspended and settleable solids form sludge deposits in the River and its tributaries which have destroyed desirable aquatic plants and animals and create sight and odor nuisance conditions which preclude use or development of riverside recreational areas; and 4) pollution of the South Platte River has affected ground-water supplies and has thus created a hazard to health.[1/]

A significant portion of these effects is contributed by municipal waste discharges. Project studies to be published at a later date will amplify the extent of damages to surface and groundwater supplies in the Basin.

Treatment Facilities

Within the past few years significant progress has been made in the control and abatement of pollution from municipal sources. However deficiencies exist. More extensive planning studies are often needed to better determine volume of flow, characteristics of wastes, and future requirements. The design of installations has not always provided for the most efficient operation. Much more effort is required to assure that facilities are constructed in accordance with plans and specifications. Substandard treatment performance is attributed in many cases to poor operational and maintenance procedures. Further studies are prerequisite towards improving treatment in the existing systems. These studies should consider: a) pretreatment of industrial wastes; b) repair or replacement of collection systems with excessive infiltration; c) modification of units and treatment processes; and d) modification of operational procedures. Management and operating personnel must ensure that the facilities are being utilized to the utmost of their capabilities and that appropriate in-plant modifications made whereby performance may be improved. The monetary investment in these systems is considerable, but without proper design, construction, operation, and maintenance the expected benefits cannot be attained.

1/ See Footnote, Page 1

The metropolitan waste collection and treatment concept should not be limited to Denver, but applied in other areas of the Basin. This arrangement should promise economical and more rigid operational control.

Serious problems are being imposed on those plants receiving wastes from slaughterhouses due to excessive discharge of paunch manure, blood, grease, offal, etc. to the treatment system. Adequate pretreatment at the slaughterhouses must be provided.

A major factor in the construction of new waste treatment facilities has been the financial assistance provided by the Federal Construction Grants Program established by the Federal Water Pollution Control Act. From January 1, 1957 to October 31, 1967, grants totaling 9.1 million dollars were awarded to communities in the South Platte River Basin for the construction of treatment works and interceptor and outfall sewers.

Operation

Active supervision of treatment works must be provided by fully qualified personnel. In addition to ability and perseverance, a knowledge of the concepts involved in the treatment process is essential. The operators must understand sewage characteristics and the functions of various units. They must be able to perform essential analytical tests. Technical proficiency varies from an understanding of basic fundamentals to a highly technical competence, depending on the methods and complexity of treatment used.

Certification of sewage works operators should be made mandatory. In addition, continued training should be provided to maintain and increase proficiencies. There is a critical need for many more qualified operators throughout the area.

Two other factors contribute to the proper operation of sewage treatment works. These are laboratory control and maintenance of records. Laboratory control is necessary to determine the degree of treatment provided by the installation and its various components. Serious problems can often be eliminated by performing certain tests and analyzing the data on a routine basis. Accurate records are necessary to appraise operational problems, predict and plan remedial construction. Records may prove invaluable in many ways and can be especially useful in the event of legal action.

Excellent guidelines on effective operation may be found in the 1963 report entitled "Recommendations for Minimum Personnel, Laboratory Control, and Records for Municipal Waste Treatment Works."[1]

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[1] Recommendations for Minimum Personnel, Laboratory Control, and Records for Municipal Waste Treatment Works, Conference of State Sanitary Engineers and the U. S. Public Health Service, Washington, D.C., June 1963

SECTION A - MUNICIPAL WASTE TREATMENT, METROPOLITAN DENVER AREA, 1965-1967

Individual reports on the current status of sewage treatment works in the Metropolitan Denver area are contained herein. These facilities were previously studied in 1964, the results of which were given in the "Municipal Waste Report-Metropolitan Denver Area-South Platte River Basin."

This section is intended to show changes made in the collection and treatment of municipal wastes within the Denver Metropolitan area since 1964. It is noted that recommendations of the earlier report have been followed by many of the entities in the study area. Completion of the Metropolitan Denver Sewage Disposal District No. 1 treatment plant has been the most significant accomplishment over this period. Waste flows from many other communities have been directed to the MDSDD#1 installation. Improvements have been made to most suburban systems continuing to provide secondary treatment. Additional improvements are needed in some cases to obtain a higher degree of treatment commensurate with maintaining satisfactory stream water quality in the Metropolitan Denver area.

Adams County

AURORA

Aurora became a member of the Metropolitan Denver Sewage Disposal District No. 1 on January 23, 1967. Under terms of agreement between Aurora and the District, the city will abandon its Westerly Creek plant on or before 1976. The Sand Creek Interceptor Sewer extension will probably be completed in 1969 and allow tie-in to the MDSDD#1 treatment works. Under the same agreement, the city will operate its Sand Creek plant until 1986, at that time title to the facility will be transferred to the District. When flows to the Sand Creek plant become greater than capacity, the excess will be diverted to the Sand Creek Interceptor Sewer for treatment by the District.

BAKER WATER AND SANITATION DISTRICT

The Baker Water and Sanitation District is one of the original members of the Metropolitan Denver Sewage Disposal District No. 1. The plant is treating about 1.0 MGD of sewage which receives chlorination and the effluent discharges to Clear Creek. An additional 0.6 MGD of untreated sewage is discharged to the Clear Creek Interceptor Sewer for primary and secondary treatment by MDSDD#1.

BRIGHTON

The Brighton treatment plant receives average sewage flows during the winter months of 0.7 MGD. In the summer flows increase to 0.9 MGD with peaks in excess of 1.3 MGD. Increased summer rates are due to excessive infiltration received into the sewers over the irrigation season. The clarifiers at this plant are designed for a flow of 2.0 MGD, but the trickling filter becomes ponded when the rate of sewage exceeds 1.0 MGD. The effluent line from the filter to the secondary clarifier appears to be undersized, as is also the line from the primary clarifier to the filter. The liquid level in the primary tank thereby rises beyond the weir during peak flows. These conditions should be corrected to ensure improved treatment performance.

FITZSIMONS GENERAL HOSPITAL

The population served by the sewage treatment plant has increased to about 3,300 persons, with resulting waste flow around 0.5 MGD. No known changes or additions have been made to the treatment system. Plant records of the past year show that effluent BOD varied from 26 to 40 mg/l and chlorine residual from 0.1 to 0.3 mg/l.

METROPOLITAN DENVER SEWAGE DISPOSAL DISTRICT NO. 1

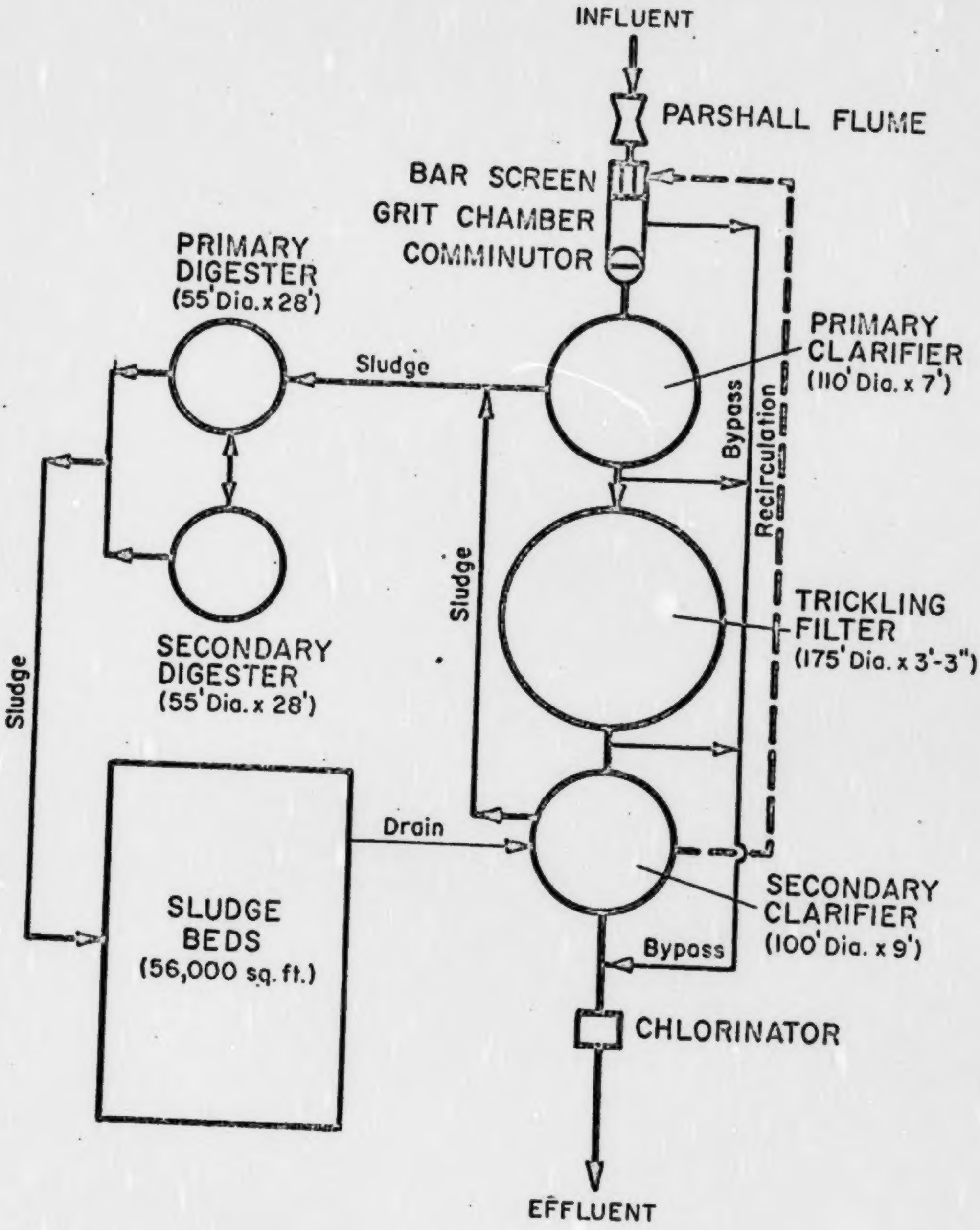
The Metro District sewage treatment plant was placed in full operation in October 1966. After testing of components, the plant was accepted from the contractor in March 1967. The first six months of operation has represented a period of break-in with respect to components, operations, and plant personnel.

Modifications have been made to the Denver Northside primary treatment facility. Liquid effluent and digested sludge from this plant are conveyed to the MDSDD#1 for further treatment.

In August 1967, MDSDD#1 provided primary treatment for 12 MGD and secondary treatment for 82 MGD of wastes on an average daily basis. The degree of treatment provided has varied considerably due to operational problems and difficulties in handling the wastes from the Denver Northside plant containing high concentrations of grease. An aeration basin has been temporarily converted in order to provide for grease removal. A recent report indicates that BOD reduction is averaging about 92% and TSS removal approximately 94%.

Membership in the District is expanding, thereby making necessary the construction of additional interceptor sewers to serve the new areas.

BOULDER
SEWAGE TREATMENT PLANT



INFLUENT
PARSHALL FLUME
BAR SCREEN
GRIT CHAMBER
COMMINUTOR
PRIMARY DIGESTER
(55' Dia. x 28')
Sludge
PRIMARY CLARIFIER
(110' Dia. x 7')
Bypass
Recirculation
Sludge
TRICKLING FILTER
(175' Dia. x 3'-3")
SECONDARY DIGESTER
(55' Dia. x 28')
Sludge
Drain
SLUDGE BEDS
(56,000 sq. ft.)
SECONDARY CLARIFIER
(100' Dia. x 9')
Bypass
CHLORINATOR
EFFLUENT

NORTH WASHINGTON WATER AND SANITATION DISTRICT

The North Washington Water and Sanitation District is one of the original members of the Metropolitan Denver Sewage Disposal District No. 1. The Thornton-North Washington pumping station, completed in July 1967, conveys the pretreated wastes from North Washington to the MDSDD#1 installation.

ROCKY MOUNTAIN ARSENAL

The treatment works serves approximately 1,000 people five days a week in addition to 120 persons residing full time. The average flow to the plant is 135,000 gpd. No recent changes have been made.

SOUTH ADAMS WATER AND SANITATION DISTRICT

No physical changes of consequence have been made to the plant since 1964. Flows have increased approximately 20 percent, resulting in an average daily flow of about 1.8 MGD with peaks up to 2.5 MGD. A feedlot which previously discharged wastes to the District's sanitary sewer after periods of heavy rainfall has since been closed.

THORNTON

Thornton became a member of the Metropolitan Denver Sewage Disposal District No. 1 on January 27, 1966. The city and its service area contains about 45,000 people. Upon completion of the Thornton-North Washington pumping station in July 1967, all wastes were diverted to MDSDD#1 and the treatment plant was abandoned.

An area in the northern part of Thornton will be served by the City of Broomfield when construction of a trunk sewer from Thornton to Broomfield is completed early in 1968.

WESTMINSTER SANITATION DISTRICT

The Westminster Sanitation District, one of the original members of the Metropolitan Denver Sewage Disposal District No. 1, serves approximately 22,000 persons from an area that includes most of Westminster, all of Shaw Heights, and some adjoining areas in Jefferson County. The primary treatment facilities are operated to provide pretreatment of the sewage before discharge to MDSDD#1. The secondary treatment facilities have been abandoned.

BUCKLEY AIR NATIONAL GUARD BASE

The volume of wastes treated by the plant has increased to 75,000 gallons per day due to the transfer of flight operations from Lowry Air Force Base. The plant serves 600 people during the day and 20 at night. Military reserve units continue to train at the Base on weekends.

Installation of chlorination facilities and recirculation from the trickling filter to the primary clarifier were recently completed. The one-mile long outfall line provides sufficient chlorine contact and chlorine residuals in the effluent approximating 0.6 mg/l have been reported.

ENGLEWOOD

The treatment works serve a population of 59,000, an increase of 3,800 over 1964. Flows range from an average of 4.9 MGD to a peak of 7.0 MGD. Peak flows are caused by high rates of infiltration into the sewers which occur after heavy rainfall. Chlorination facilities, including a contact basin, were placed into operation in March 1967. Plant personnel report that the chlorine residual in the effluent is maintained at 0.4-0.6 mg/l and the treatment system is providing 82% BOD removal.

GLENDALE

No additions have been made to the existing treatment works. However, the detention ponds are overflowing to Cherry Creek.

LITTLETON

The population served by the plant has increased to 24,000. Average flow for 1966 varied from 2.8 MGD in February to 3.9 MGD in July. This variation was apparently due, in part, to infiltration into the older sewer system. The trickling filters of the older plant are being used in conjunction with those of the newer plant to provide two-stage trickling filter operation. The older digesters and clarifiers have been cleaned, reconditioned, and readied for use when needed. Installation of chlorination facilities is planned. However, a definite schedule has not been established. Adequate mixing and chlorine contact time are proposed in the outfall and siphon and discharge line.

CITY AND COUNTY OF DENVER

The City and County of Denver is one of the original members of the Metropolitan Denver Sewage Disposal District No. 1. The Denver Eastside treatment plant has been abandoned. Sewage from the area formerly served by this plant is conveyed to MDSDD#1 via the Sand Creek Interceptor sewer. The Denver Northside plant provides primary treatment for an average flow of about 70 MGD and discharges its effluent to MDSDD#1. Digested sludge is pumped to the Metro District plant for dewatering, drying, and incineration.

Grease removal by the Northside plant is unsatisfactory due to the discharge of excessive amounts of paunch manure from slaughterhouses to the Denver sanitary sewers. A program is underway to provide for at least 80 percent removal of paunch manure by pretreatment at the respective meat industry plants. Modifications are also underway at the Northside plant to provide additional air capacity and a cross collector system for the pre-aeration units. Completion of these improvements is scheduled for late 1968.

ARVADA

Arvada is one of the original members of the Metropolitan Denver Sewage Disposal District No. 1. The plant is providing treatment for a flow of approximately 1.0 MGD. Installation of chlorination facilities was completed in July 1967 and effluent discharged to Clear Creek. Waste flows approximating 2.5 MGD are diverted to MDSDD#1.

CLEAR CREEK VALLEY WATER AND SANITATION DISTRICT

The Clear Creek Valley Water and Sanitation District, originally scheduled to join the Metropolitan Denver Sewage Disposal District No. 1, instead chose to expand its treatment facilities. A Chicago Pump Company "Rapid Bloc" aeration and secondary clarifier unit was added to provide treatment of the effluent from the trickling filter. The original secondary clarifier was converted to a chlorine contact basin and chlorination facilities provided. Improvements also included construction of an additional digester and provision for a flow totalizer. The capacity of the plant is 2.1 MGD, and the average daily flow is 1.75 MGD. Operating and maintenance staffs have been increased to eight people. Laboratory facilities are used for plant control and monitoring of influent and effluent. A packing plant has recently initiated pretreatment of its wastes prior to discharging to the District's sewers.

EVERGREEN

In addition to a plant operator, Evergreen employs a part-time assistant. Extensive mechanical repairs and installation of new piping were accomplished. Laboratory facilities have been expanded and a sampling program initiated to determine performance of the plant and its various components. Chlorination facilities are in operation. Recent sampling conducted by the operator indicated the system was providing 71-82 percent BOD removal. The State Water Pollution Control Commission determined overall plant BOD removal to be about 71 percent in June 1967 and 91 percent in July 1967. Operational difficulties are still being encountered, but further studies and repairs are being made.

FEDERAL YOUTH CENTER

In the Fall of 1966 the Federal Youth Center, formerly the Federal Correctional Institute, was connected to the Lakehurst Water and Sanitation District, which in turn is served by the City and County of Denver's sewer system. The treatment facilities have been abandoned.

FRUITDALE SANITATION DISTRICT

The Fruitdale Sanitation District is not a member of the Metropolitan Denver Sewage Disposal District No. 1. The District is awaiting a court decision on determination of water rights if the plant effluent is diverted to MDSDD#1 rather than to Clear Creek. Necessary arrangements are underway for a temporary connection from the plant to the MDSDD#1 Clear Creek Interceptor until the issue is resolved.

GOLDEN (ADOLPH COORS COMPANY)

The Adolph Coors Company treatment plant has been expanded to meet demands imposed by increased production. The plant provides treatment for brewery wastes and domestic sewage from the City of Golden, approximately 3.0 MGD. The influent BOD concentration averaged about 1400 mg/l. Construction of 12 additional aeration units was recently completed. A 120-foot diameter final clarifier is scheduled for completion in June 1968. Chlorination facilities are being modified to provide automatic control based on chlorine residual and flow rate. Engineering and pilot scale studies are underway to determine the feasibility of installing a sludge drying system. A BOD removal approximating 95% has been reported.

MOUNT VIEW GIRLS SCHOOL

The institution, formerly known as the Colorado Training School for Girls, ceased operation of its treatment facilities in late 1966, and discharges wastes to the Lakehurst Water and Sanitation District.

NORTHWEST LAKEWOOD SANITATION DISTRICT

The Northwest Lakewood Sanitation District, an original member of the Metropolitan Denver Sewage Disposal District No. 1, provides primary treatment before discharging its wastes to MDSDD#1. Westridge Sanitation District, previously served by the Northwest Lakewood plant, became a member of MDSDD#1 on June 27, 1966 and now discharges wastes directly to the Metro District's Clear Creek Interceptor. Applewood and Pleasant View Sanitation Districts continue to be served by Northwest Lakewood. The Applewood Sanitation District became a member of MDSDD#1 on August 15, 1967 and will be connected to the Clear Creek Interceptor in 1968. The Pleasant View Sanitation District became a member of MDSDD#1 in October 1967, and will connect to the Clear Creek Interceptor in late 1967. The Camp George West (Colorado National Guard) sewage treatment plant was dismantled in 1966. The collection system was connected to the sewers of Pleasant View Sanitation District.

SOUTH LAKEWOOD SANITATION DISTRICT

The average flow treated by the plant during 1966 varied from 0.75 MGD in the winter to 1.0 MGD in the summer. Maximum flows of 1.2 MGD are encountered during periods of excessive infiltration. An additional aerobic digester and a final clarifier have been completed and the existing digester covered. Supplementary laboratory equipment was procured. One full-time and several part-time employees were added. Disinfection was not satisfactory at the time of sampling.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli /100 ml
12/12/66 1430	7.6	32	180	21	16	<0.1	2.2×10^6	700,000

WHEATRIDGE SANITATION DISTRICT

The Wheatridge Sanitation District is one of the original members of the Metropolitan Denver Sewage Disposal District No. 1. The plant effluent line was connected to MDSDD#1 Clear Creek Interceptor Sewer in order that treated wastes or by-passed sewage could be discharged to the Interceptor. At the time of visit, all sewage was treated by the District's plant and discharged to Clear Creek. Project sampling data are given on page 18. All wastes should be discharged to MDSDD#1 facilities.

Wheatridge Sanitation District

Date	Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml
EFFLUENT									
12/12/66	1345	7.4	71	230	52	32	0.7	490,000	70,000
1/18/67	0930	7.7	40	145	55	43	0.4	46,000	7,000
1/18/67	1500	7.6	51	191	57	44	0.3	7,900	330
1/19/67	1300	7.7	56	222	59	46	0.2	130,000	14,000
1/19/67	1400	7.7	45	206	65	53	0.3	92,000	13,000
1/20/67	0800	7.5	30	238	41	34	0.1	13,000	460
1/20/67	1330	7.7	116	335	115	94	0.7	7.9×10^{6}	2.2×10^{6}
Average		7.6	58	224	63	50	0.4	92,000	13,000
INFLUENT									
1/18/67	0900	7.0	360	785	326	279	14.0	--	--
1/18/67	1500	6.7	340	690	375	342	6.5	--	--
Average		6.9	350	738	350	310	10.3	--	--
PERCENT REMOVALS			83		82	84	90		

SECTION B-MUNICIPAL WASTE TREATMENT, REMAINDER OF BASIN

Section B contains individual reports on the current status of municipal waste treatment facilities for the remainder of the South Platte River Basin. Communities discharging untreated sewage are included in this section. Entities served by individual systems or by facilities of other sanitation districts are listed in Section C.

Adams County

BENNETT SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 435

The Bennett Sanitation District sewage lagoons located approximately three-quarters of a mile north of Bennett were completed in 1960. This treatment system consists of two cells having a surface area of two acres each which can be operated either in series or parallel. Only one cell is used, having a water depth of about one foot. No overflow was observed on March 10, 1967, possibly due to excessive percolation.

HI-LAND ACRES WATER AND SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Pond
Population Served: 100

The Hi-Land Acres Subdivision is located three miles west of Brighton near State Highway 7. The lagoon, completed in fall 1964, covers an area of 1.3 acres. When visited on March 10, 1967, the pond was not overflowing.

MODERN CITY TRAILER PARK

Type of Treatment: Primary-Septic Tanks
Population Served: 110

The Modern City Trailer Park is located in the Metropolitan Denver area at 5601 Federal Boulevard. Treatment facilities consist of two septic tanks, one located on the west edge of the property and the other near the east edge. The combined overflow is discharged to a ditch, RM 311.1-5.0-0.6, located immediately north of the trailer court, which in turn flows to Clear Creek. The manager reported that a commercial chemical is added to the septic tanks once a week. The tanks are pumped out approximately every sixty days and solids removed from the site.

DEERTRAIL

Type of Treatment: Secondary-Waste Stabilization Pond
Population Served: 425

The Deertrail waste stabilization pond is located two miles northwest of town and one-half mile southwest of U. S. Highway 40 and has a surface area of about three acres. No discharge was evident on June 23 and 27, 1966, and March 10, 1967. Downward seepage is apparent.

EAST CHERRY CREEK VALLEY WATER AND SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Pond
Population Served: 10

The East Cherry Creek Valley Water and Sanitation District treatment pond is located about one-half mile north of East Hampden Avenue and approximately two miles east of Cherry Creek Reservoir, adjacent to West Toll Gate Creek, RM 312.1-8.1-4.8-6.0. The lagoon was not overflowing at the time of visit.

Boulder County

BOULDER

Type of Treatment: Secondary-Trickling Filter
Population Served: 56,000

The Boulder sewage treatment plant (see diagram) is located approximately one mile east of 30th Street and one-third mile south of Valmont Road and discharges effluent to Boulder Creek, RM 270.0-17.4-21.3. The high-rate trickling filter plant placed in operation in December 1957 was designed for an average sewage flow of 4.3 MGD and a BOD loading of 7800 pounds per day. A coil-type vacuum filter was added in 1966 to dewater a portion of the sludge, thereby reducing the load to the digesters. The filtered sludge was hauled to a landfill. Chlorination in the outfall was provided with a reported detention time of five minutes.

The sewer system has experienced high rates of infiltration particularly in the older sections of the city with open sewer joints. Flows to the plant are 7.5 MGD, of which over 2.0 MGD is ground water.

Five men are employed to operate and maintain the plant 24 hours per day, seven days per week. Adequate laboratory facilities are provided for plant control and for monitoring the influent and effluent. Complete laboratory and operation records are maintained. Laboratory analyses were routinely performed, including BOD, settleable solids, suspended solids, volatile acids, and pH.

Results of 24-hour composite samples collected and analyzed in January 1967 by plant personnel indicate that: 1) influent BOD varied from 240 to 280 mg/l and effluent BOD varied from 100 to 193 mg/l; 3) suspended solids ranged from 142 to 183 mg/l in the influent to 49 to 99 mg/l in the effluent; 3) settleable solids in the effluent were 0.6 ml/l.

The plant is seriously overloaded due to the rapid growth of the area. A 4.5 MGD trickling filter plant is presently under construction at another location and is expected to be in operation by April 1968. This facility should relieve the overloaded conditions presently experienced.

BROOMFIELD

Type of Treatment: Secondary-Trickling Filter
Population Served: 8000

The Broomfield sewage treatment works (see diagram) is located about three miles east of the community and discharges effluent to Big Dry Creek, RM 288.6-23.1. The high-rate trickling filter plant constructed in 1955 was designed to serve 8000 people. The average daily flow varies from 0.75 to 0.80 MGD. A chlorinator and chlorine contact basin were added early in 1967. Additional recirculation facilities were also completed at that time to improve efficiency of treatment.

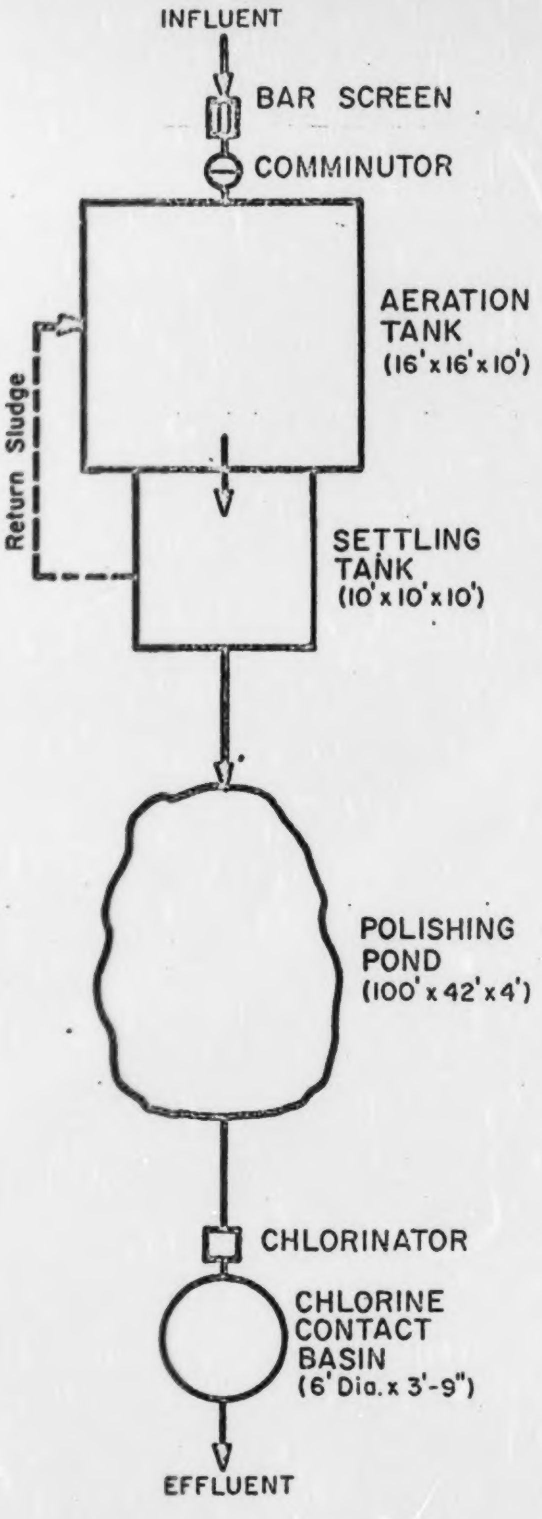
An operator is employed for 48 hours, a seven-day week, to operate and maintain the system. Laboratory analyses for total suspended solids, volatile suspended solids, settleable solids, pH, and volatile acids are performed once each week. Because this plant is operating near design capacity, Broomfield is developing plans to double the size of the plant.

GUNBARREL ESTATES WATER AND SANITATION DISTRICT

Type of Treatment: Secondary-Extended Aeration
Population Served: 280

Gunbarrel Estates is a subdivision located near the International Business Machines Corporation plant northeast of Boulder. The sewage treatment plant (see diagram) is located approximately 400 feet east of 71st Street and just south of Gunbarrel Road. Effluent is discharged to Dry Creek, RM 270.0-19.9-11.0. Treatment is provided by a Yeoman "Yeowave" package plant. The system, designed for 18,000 gpd, was installed in 1963. Approximately seven manhours per week are devoted to the operation and maintenance of this facility. No laboratory analyses are performed. At the time of sampling the chlorination facilities were not operating properly.

CHERRY CREEK RESERVOIR RECREATION AREA SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
COMMINUTOR
AERATION TANK (16'x16'x10')
Return Sludge
SETTLING TANK (10'x10'x10')
POLISHING POND (100'x42'x4')
CHLORINATOR
CHLORINE CONTACT BASIN (6' Dia. x 3'-9")
EFFLUENT

The present method of treatment should be abandoned and connection made to a nearby sanitation district.

Effluent Data: Modern City Trailer Park

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml
1/11/67 1030	7.4	295	532	64	53	0.1	11×10^6	7.9×10^6

STRASBURG SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 680

The Strasburg Sanitation District sewage treatment works are located about one mile north of Strasburg. These facilities completed in 1955 consist of four lagoons operated in series with a total surface area of about ten acres. The lagoon site overlies an abandoned prairie dog town, resulting in excessive percolation. Because of this factor the District was using only two cells in an attempt to maintain suitable depth. Operational difficulties will most likely continue to occur.

Arapahoe County

BYERS SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 500

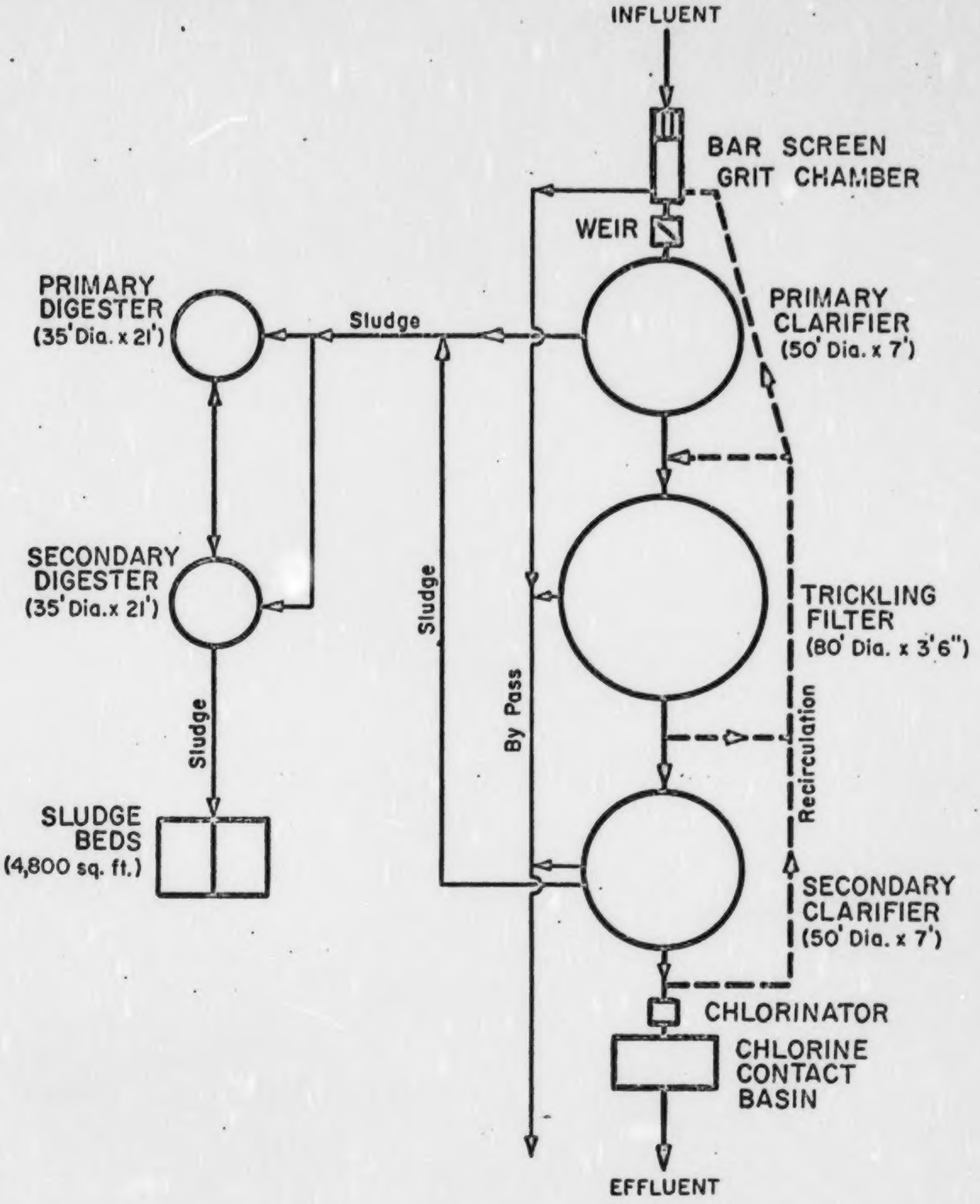
The Byers Sanitation District sewage lagoons are located on the north side of U. S. Highway 40 about one-quarter mile west of the community. The outfall was routed under Interstate Highway 70 to West Bijou Creek, RM 200.0-44.3R-14.9. The system consists of three stabilization ponds, two of which were constructed in 1958 and the third in 1964. The total surface area approximates 1.5 acres. No overflow was observed when visited in June 1966 and March 1967; excessive seepage is apparent.

CHERRY CREEK RESERVOIR RECREATION AREA

Type of Treatment: Secondary-Extended Aeration
Population Served: Varies

The Cherry Creek Reservoir Recreation Area sewage treatment facility (see diagram) is located near the northeast corner of the reservoir and discharges to an intermittent stream, RM 317.7-13.0-0.4, flowing into the reservoir. The plant, constructed in 1963, serves the sanitary facilities in the area and is operated by the Colorado State Parks and Recreation Board. The facility with a capacity of 18,000 gpd was designed to accommodate 2750 visitors per day. The polishing pond was not overflowing when visited on June 23 and 27, and July 20, 1966.

BROOMFIELD
SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
GRIT CHAMBER
WEIR
PRIMARY DIGESTER
(35' Dia. x 21')
Sludge
PRIMARY CLARIFIER
(50' Dia. x 7')
SECONDARY DIGESTER
(35' Dia. x 21')
Sludge
By Pass
TRICKLING FILTER
(80' Dia. x 3'6")
Recirculation
Sludge
SLUDGE BEDS
(4,800 sq. ft.)
SECONDARY CLARIFIER
(50' Dia. x 7')
CHLORINATOR
CHLORINE CONTACT BASIN
EFFLUENT

SAMPLING DATA
BROOMFIELD SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
3/15/66	0900	Grab	12	7.8	53	182	1210	68	57	0.1	2,800,000	490,000	--
3/15/66	1100	Grab	--	8.0	76	216	1300	82	65	0.3	9,500,000	2,300,000	--
3/15/66	1300	Grab	14	7.9	69	230	1220	73	69	<0.1	7,900,000	4,900,000	--
3/16/66	0800	Grab	12	7.6	48	155	1110	52	50	0.2	4,900,000	1,700,000	--
3/16/66	1200	Grab	14	7.8	87	262	1270	93	75	0.7	4,900,000	1,700,000	--
3/16/66	1500	Grab	14	7.8	91	290	1160	135	104	0.1	23,000,000	23,000,000	--
3/17/66	1000	Grab	11	7.9	88	190	1180	71	67	<0.1	4,900,000	1,700,000	--
3/17/66	1200	Grab	10	8.0	82	206	1270	74	62	<0.1	13,000,000	2,300,000	--
3/17/66	1400	Grab	11	8.0	84	210	1200	90	74	0.1	4,600,000	3,300,000	--
3/15/66		Comp	--	8.0	69	198	1270	66	51	<0.1	--	--	3.9
3/16/66		Comp	--	7.9	75	226	1230	103	87	0.1	--	--	4.8
3/17/66		Comp	--	8.1	90	208	1200	73	59	<0.1	--	--	5.1
Average (Grabs)			12	7.9	75	216	1213	82	69	<0.2	4,900,000	2,300,000	
Average (Composites)				8.0	78	211	1233	81	66	<0.1			4.6
INFLUENT													
3/15/66	0900	Grab	12	7.6	345	590	1270	253	234	14.0	28,000,000	9,500,000	--
3/15/66	1100	Grab	14	7.7	280	600	1000	251	219	10.0	33,000,000	3,300,000	--
3/15/66	1300	Grab	14	7.5	220	470	1010	218	175	8.0	17,000,000	7,000,000	--
3/16/66	0800	Grab	11	7.8	100	277	1300	141	128	7.0	--	--	--
3/16/66	1200	Grab	14	7.4	275	720	930	202	175	8.0	--	--	--
3/16/66	1500	Grab	14	7.4	480	810	970	294	266	7.0	--	--	--
3/17/66	1000	Grab	12	7.5	400	735	1030	296	257	13.0	--	--	--
3/17/66	1200	Grab	14	7.4	255	900	970	185	163	6.0	--	--	--
3/17/66	1400	Grab	--	7.5	325	>990	990	233	203	5.0	--	--	--
3/15/66		Comp	--	8.0	245	1120	1110	317	268	6.5	--	--	6.8
3/16/66		Comp	--	7.8	240	910	1100	249	223	6.5	--	--	7.1
3/17/66		Comp	--	8.0	285	700	1100	199	173	4.0	--	--	7.7
Average (Grabs)			13	7.5	298	>677	1052	230	202	8.7	28,000,000	7,000,000	
Average (Composites)				7.9	257	910	1103	255	221	5.7			7.2
PERCENT REMOVALS (Composites)					69			68	70	>98			

Effluent Data: Gunbarrel Estates Water and Sanitation District

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
7/6/66									
1230	7.6	23	64	28	28	<0.1	170×10^6	1.5×10^6	0.8
1430	7.7	22	76	24	22	<0.1	11×10^6	1.3×10^6	1.0

LAFAYETTE

Type of Treatment: Secondary-Trickling Filter
Population Served: 3000

The Lafayette sewage treatment plant (see diagram) is located two miles east and one-half mile north of the community. The plant effluent is discharged to Coal Creek, RM 270.0-17.4-7.9-8.6. The high-rate trickling filter plant, placed in operation in September 1965, is serviced by one man devoting less than two hours per day. Analyses of sampling data are given in the table on pages 25-26.

LAKE ELDORA SKI AREA

Type of Treatment: Primary-Septic Tank and Leaching Field
Population Served: Varies

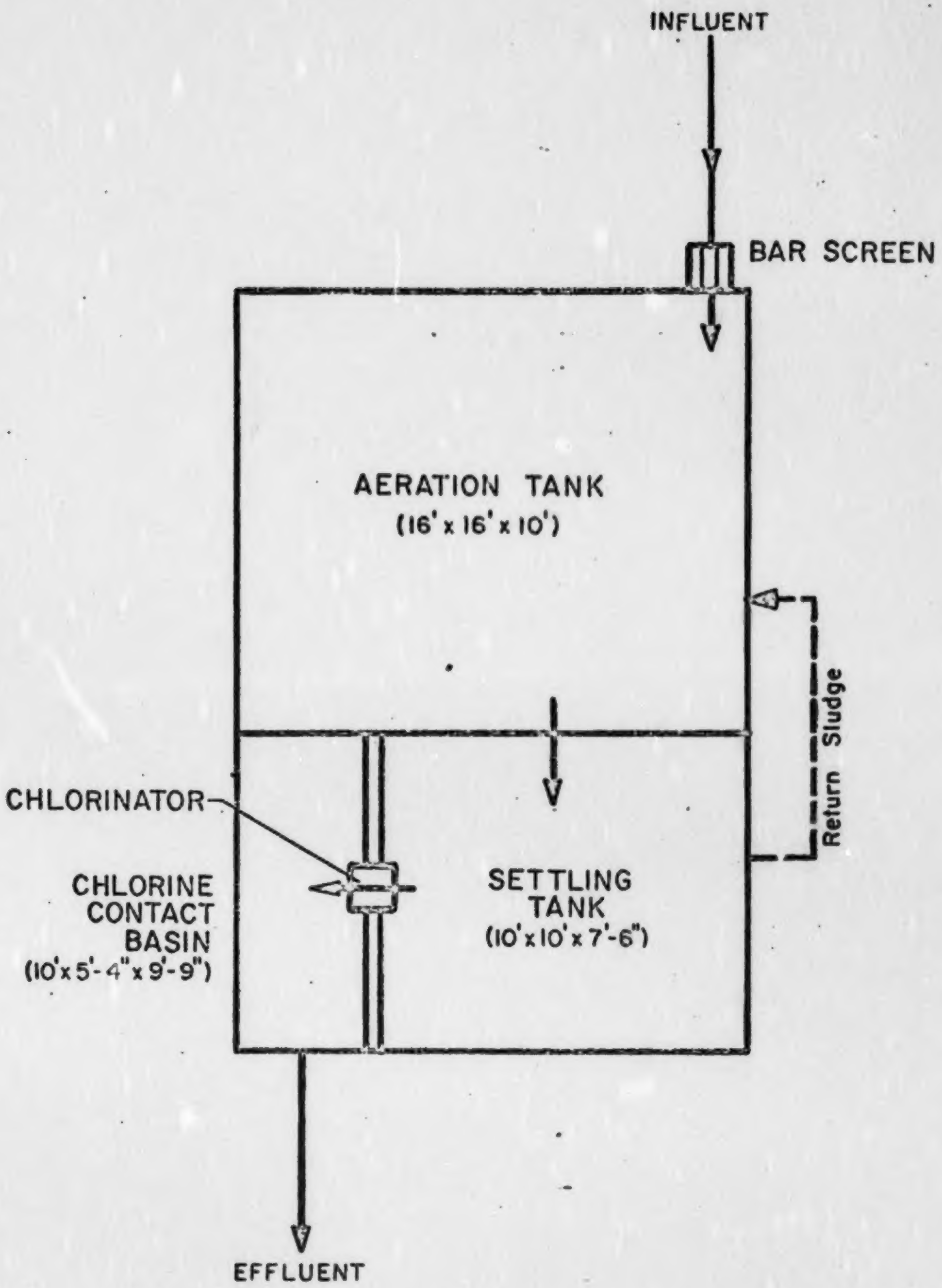
The Lake Eldora Ski Area is located three miles west of Nederland and one-half mile above Lake Eldora, RM 270.0-17.4-32.8L-10.7-1.1, in the Roosevelt National Forest. Treatment facilities consist of two 2000-gallon septic tanks in series followed by two leaching fields in series. The system was constructed in late 1962 and serves an average of 1200 persons per week during the skiing season.

LAKE VALLEY ESTATES WATER AND SANITATION DISTRICT

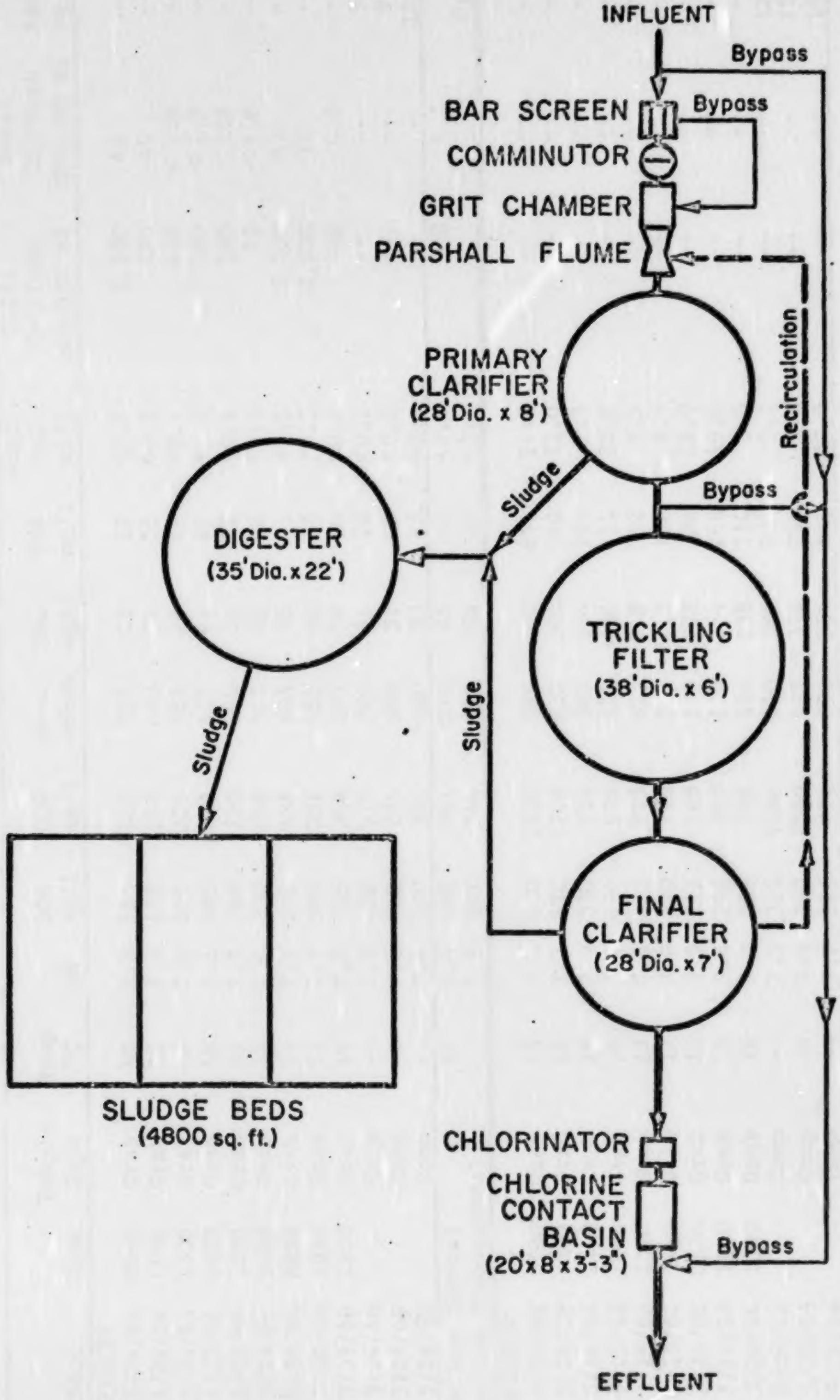
Type of Treatment: Secondary-Extended Aeration
Population Served: 12

Lake Valley Estates (formerly Boulder Fairways) is a housing subdivision located north of Boulder. The sewage treatment plant (see diagram) is located on the north side of Lefthand Valley Reservoir, RM 270.0-19.9-17.4, about one mile east of State Highway 7. Effluent is pumped to a small reservoir and serves to irrigate a nearby golf course. Treatment is provided by a Chicago Pump Company "Rapid Bloc" package plant. The system was designed to serve a population of 430. Construction of an additional 600 homes was scheduled to begin in 1967 at the rate of 50 houses per year.

GUNBARREL ESTATES
WATER AND SANITATION DISTRICT
SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
AERATION TANK
(16' x 16' x 10')
Return Sludge
CHLORINATOR
CHLORINE
CONTACT
BASIN
(10' x 5'-4" x 9'-9")
SETTLING
TANK
(10' x 10' x 7'-6")
EFFLUENT

LAFAYETTE SEWAGE TREATMENT PLANT


INFLUENT
Bypass
BAR SCREEN
Bypass
COMMINUTOR
GRIT CHAMBER
PARSHALL FLUME
Recirculation
PRIMARY CLARIFIER (28' Dia. x 8')
Sludge
DIGESTER (35' Dia. x 22')
Bypass
TRICKLING FILTER (38' Dia. x 6')
Sludge
Sludge
FINAL CLARIFIER (28' Dia. x 7')
SLUDGE BEDS (4800 sq. ft.)
CHLORINATOR
CHLORINE CONTACT BASIN (20' x 8' x 3'-3")
Bypass
EFFLUENT

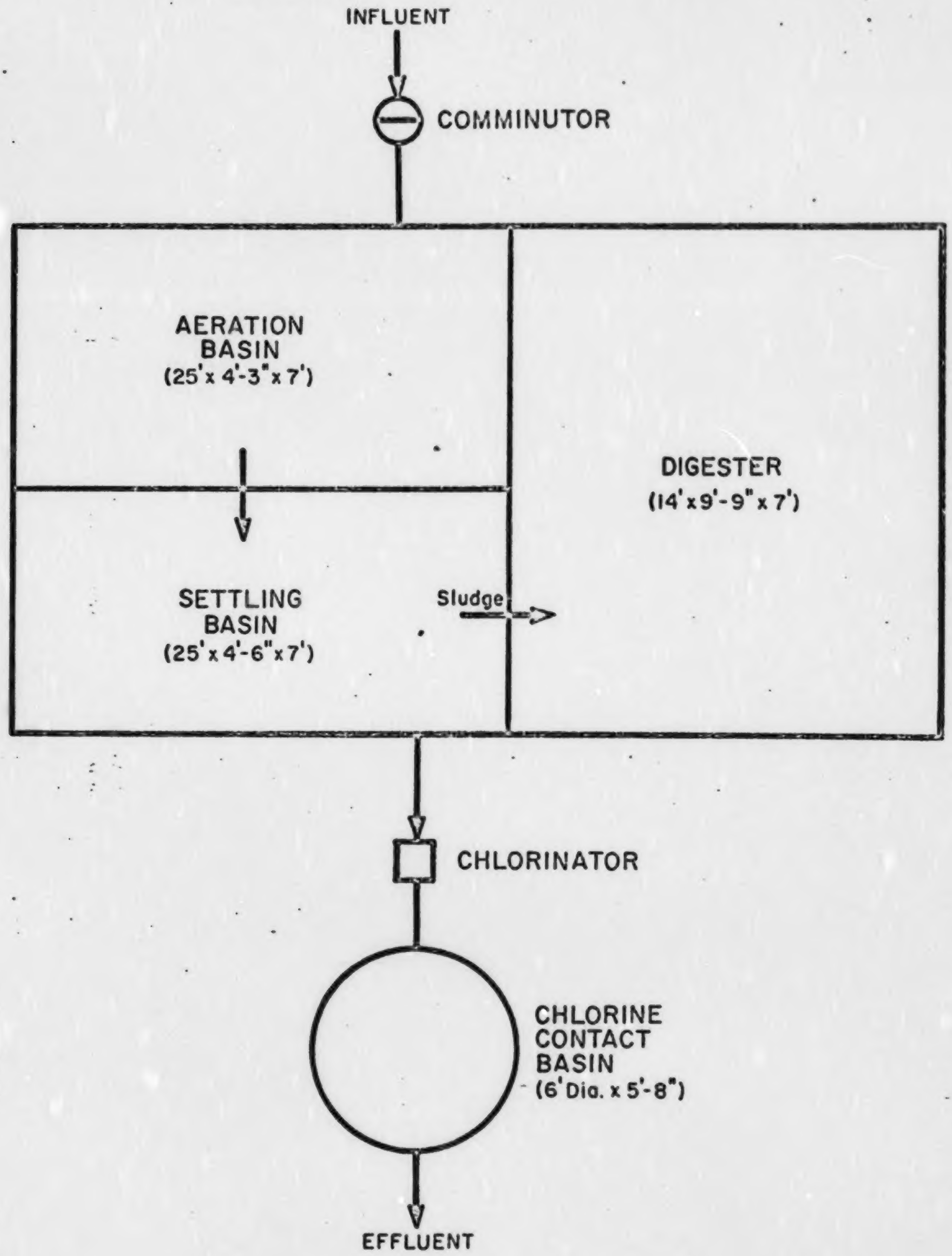
SAMPLING DATA
LAFAYETTE SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1	Cl Res. mg/1
EFFLUENT														
5/24/66	0900	Grab	18	7.3	185	435	585	22	22	<0.1	1,300	46	--	--
5/24/66	1100	Grab	16	7.6	135	333	600	64	56	<0.1	170	49	--	0.3
5/24/66	1300	Grab	18	7.6	101	329	585	27	27	<0.1	430	< 1.8	--	0.2
5/25/66	1000	Grab	16	7.3	106	298	515	49	47	<0.1	180	< 1.8	--	0.3
5/25/66	1200	Grab	18	7.5	104	290	540	50	47	<0.1	330	<1.8	--	0.3
5/25/66	1400	Grab	18	7.6	100	288	565	49	48	<0.1	79	<1.8	--	1.0
5/26/66	0830	Grab	16	7.2	200	396	605	48	41	<0.1	1,100	49	--	0.4
5/26/66	1030	Grab	17	7.3	180	352	585	61	52	<0.1	2,300	33	--	0.0
5/26/66	1500	Grab	18	7.3	165	344	605	38	34	<0.1	330	4.5	--	0.3
5/24/66		Comp	--	7.5	150	372	570	86	78	<0.1	--	--	9.8	0.7
5/25/66		Comp	--	7.6	122	295	555	51	45	<0.1	--	--	9.8	>1.0
5/26/66		Comp	--	7.4	170	366	660	55	45	<0.1	--	--	12.2	<0.1
Average (Grabs)			17	7.4	142	341	576	45	42	<0.1	330	4.5		0.3
Average (Composites)				7.5	147	344	595	64	56	<0.1			10.6	0.6
INFLUENT														
5/24/66	0900	Grab	16	7.4	440	1220	685	662	634	11.0	--	--	--	--
5/24/66	1100	Grab	16	7.2	420	1200	610	586	540	12.0	--	--	--	--
5/24/66	1300	Grab	16	7.0	310	730	580	184	180	7.5	--	--	--	--
5/25/66	1000	Grab	16	7.1	450	970	850	450	414	22.0	--	--	--	--
5/25/66	1200	Grab	17	7.0	375	795	615	248	222	9.5	--	--	--	--
5/25/66	1400	Grab	17	7.0	390	770	550	218	188	9.5	--	--	--	--
5/26/66	0830	Grab	16	7.5	255	765	585	288	238	22.0	--	--	--	--
5/26/66	1030	Grab	16	7.8	390	970	820	354	286	16.0	--	--	--	--
5/26/66	1500	Grab	16	7.3	265	705	495	238	214	8.0	--	--	--	--
5/24/66		Comp	--	7.5	310	1160	610	384	354	7.5	--	--	13.9	--
5/25/66		Comp	--	7.5	360	1390	625	314	284	9.5	--	--	12.2	--
5/26/66		Comp	--	7.2	395	720	650	556	510	10.0	--	--	14.2	--
Average (Grabs)			16	7.3	366	903	643	359	324	13.0				
Average (Composites)				7.4	355	1090	628	418	383	9.0			13.4	
PERCENT REMOVALS (Composites)					58			84	85	>99				

SAMPLING DATA (continued)
LAFAYETTE SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1	Cl Res. mg/1
EFFLUENT														
1/25/67	1100	Grab	7	8.0	66	337	750	35	25	0.1	18,000	700	--	--
1/25/67	1305	Grab	10	7.8	72	259	913	55	42	<0.1	350,000	33,000	--	--
1/25/67	1505	Grab	8	7.8	56	321	954	134	60	0.2	11,000	220	--	--
1/26/67	1005	Grab	5	8.1	65	192	750	22	19	<0.1	1,100	70	--	0.3
1/26/67	1200	Grab	8	8.1	49	176	778	20	18	<0.1	840	70	--	--
1/26/67	1405	Grab	9	8.0	64	204	808	22	20	<0.1	330	310	--	<0.1
1/27/67	0900	Grab	8	7.9	61	203	695	33	32	<0.1	28,000	220	--	--
1/27/67	1105	Grab	9	8.0	70	259	813	42	37	0.1	700,000	110,000	--	--
1/27/67	1305	Grab	10	7.8	97	353	869	61	54	<0.1	49,000	7,900	--	--
1/25/67		Comp	--	7.8	51	277	840	70	47	0.2	--	--	1.8	--
1/26/67		Comp	--	8.0	48	198	750	32	27	<0.1	--	--	1.1	<0.1
1/27/67		Comp	--	7.8	85	216	758	56	48	<0.1	--	--	1.0	--
Average (Grabs)			8	8.0	67	256	815	69	34	<0.1	18,000	310		<0.2
Average (Composites)				7.8	61	230	783	53	41	<0.1			1.3	<0.1
INFLUENT														
1/25/67	1100	Grab	12	7.6	335	638	954	234	202	6.0	48,000,000	14,000,000	--	--
1/25/67	1300	Grab	9	7.2	270	525	808	176	140	3.0	22,000,000	4,900,000	--	--
1/25/67	1500	Grab	8	6.9	355	646	778	321	280	9.0	23,000,000	7,900,000	--	--
1/26/67	1000	Grab	8	8.6	390	532	1105	490	451	18.0	49,000,000	23,000,000	--	--
1/26/67	1205	Grab	10	8.0	335	626	808	238	204	10.0	11,000,000	2,300,000	--	--
1/26/67	1400	Grab	10	8.0	365	764	913	217	167	5.5	17,000,000	7,000,000	--	--
1/27/67	0905	Grab	10	8.8	395	519	1075	349	314	20.0	49,000,000	23,000,000	--	--
1/27/67	1100	Grab	11	8.7	430	814	935	379	332	14.0	130,000,000	22,000,000	--	--
1/27/67	1300	Grab	11	7.8	260	411	710	188	161	7.5	33,000,000	3,300,000	--	--
1/25/67		Comp	--	7.4	330	683	874	322	281	11.0	--	--	2.1	--
1/26/67		Comp	--	8.6	360	623	913	246	214	10.0	--	--	1.9	--
1/27/67		Comp	--	8.2	290	754	878	289	256	10.0	--	--	1.9	--
Average (Grabs)				10	348	608	898	288	250	10.0	33,000,000	7,900,000		
Average (Composites)				8	327	687	888	286	250	10.3			2.0	
PERCENT REMOVALS (Composites)					81			81	84	>99				

LAKE VALLEY ESTATES
WATER AND SANITATION DISTRICT
SEWAGE TREATMENT PLANT


INFLUENT
COMMINUTOR
AERATION BASIN (25'x 4'-3"x 7')
SETTLING BASIN (25'x 4'-6"x 7')
Sludge
DIGESTER (14'x 9'-9" x 7')
CHLORINATOR
CHLORINE CONTACT BASIN (6' Dia. x 5'-8")
EFFLUENT

Effluent Data: Lake Valley Estates Water and Sanitation District

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
6/22/66 1200	8.0	6	24	10	7	<0.1	70,000	4,900	0.1
7/5/66 1400	8.2	4	12	6	4	<0.1	4,900	70	0.2
7/20/66 1430	8.5	3	24	11	6	<0.1	17,000	1,700	0.2

LONGMONT

Type of Treatment: Secondary-Trickling Filter
Population Served: 17,500

The Longmont sewage treatment plant (see diagram) is located on the southeast edge of the community and discharges to a drainage ditch passing through the plant site with final disposal to St. Vrain Creek, RM 270.0-22.5. The facility, constructed in 1960, is a high-rate trickling filter system designed for a flow of 4.0 MGD. Waste loads are primarily domestic but some industrial load is contributed by a turkey processing plant. This poultry establishment releases an average of 0.3 MGD of wastes from mid-June to mid-December. Feathers are removed by screening at the factory.

Average daily flows varied from 1.8 MGD to 4.0 MGD during the past year with peak flow rates exceeding 7.0 MGD. High flows are due primarily to large volumes of ground water and storm water which enter the sanitary sewers. Previous engineering studies indicate the average annual ground-water flow into the sanitary sewers over the last four years was 2.3 MGD, averaging 1.8 MGD in winter and 3.0 MGD during summer. The average annual combined domestic sewage and industrial waste flow to the treatment plant is 1.2 MGD or 75 gallons per capita per day.

The inter-connections between the sanitary sewers, sub-drains, and storm sewers not only permits the entry of storm water and ground water into the sanitary sewers, but also allows the flow of domestic sewage into the storm sewers and the ground-water table. Analyses of samples collected from a large storm sewer discharging to St. Vrain Creek within Longmont indicated the presence of raw sewage with BOD concentrations up to 360 mg/l.

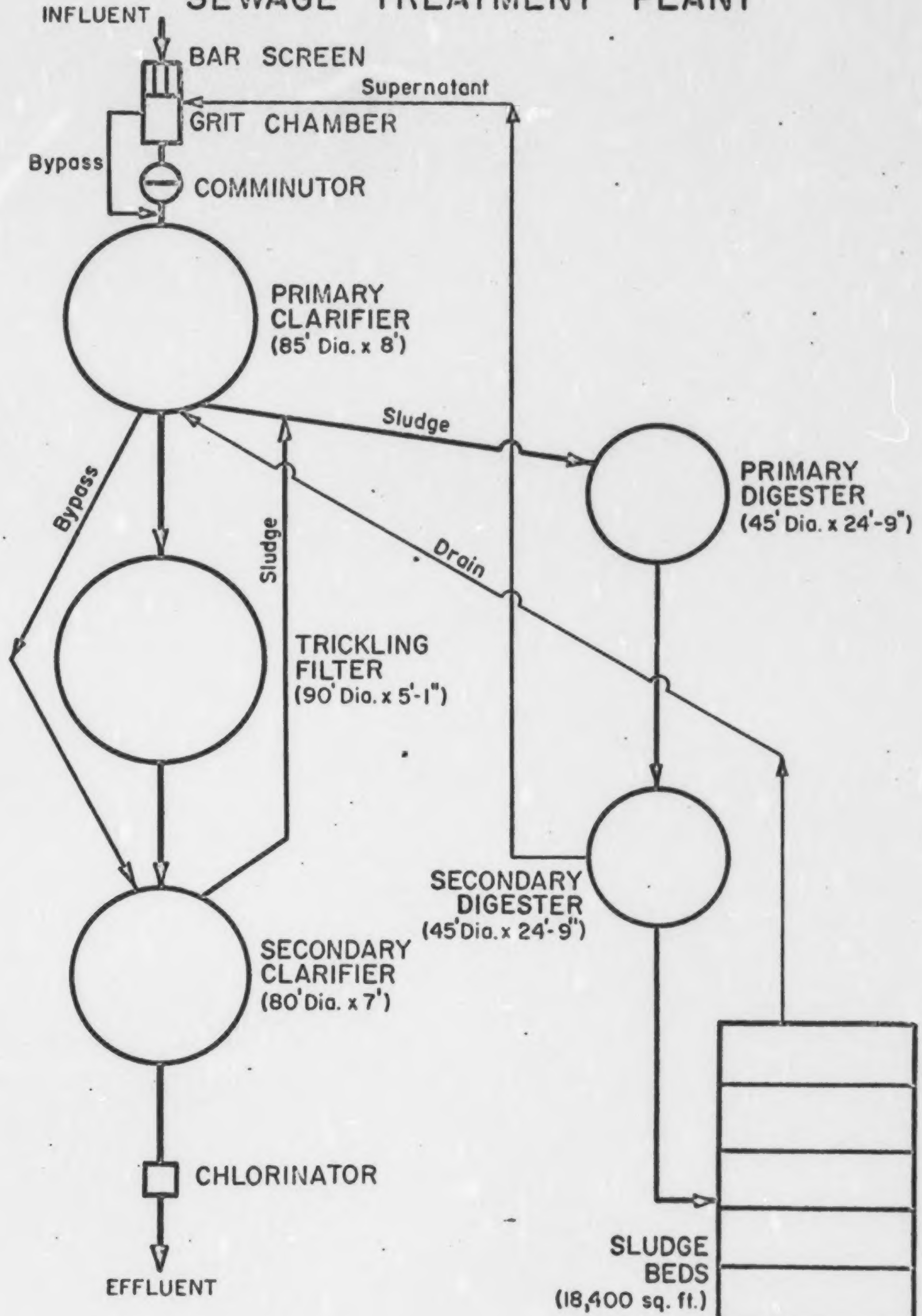
A chlorinator was installed in 1966, but no chlorine-contact basin has been provided. Two persons are employed as operators while a third person performs BOD and settleable solids tests on the influent and effluent.

Longmont has engaged the services of an engineering firm to conduct a thorough study of the sewer system and recommend a long-range plan for the correction of deficiencies found.

SAMPLIN ATA
LONGMONT SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1	NO_3N mg/1	NH_3N mg/1
EFFLUENT															
2/16/66	0900	Grab	6	7.8	43	102	985	23	23	<0.1	4,600,000	780,000	--	--	--
2/16/66	1100	Grab	7	7.8	55	128	975	34	34	<0.1	7,000,000	1,300,000	--	--	--
2/16/66	1300	Grab	8	7.8	56	120	1000	29	29	<0.1	4,600,000	2,300,000	--	--	--
2/16/66	1500	Grab	8	7.8	58	108	900	40	40	<0.1	4,900,000	1,300,000	--	--	--
2/17/66	0830	Grab	6	7.8	60	134	940	38	34	<0.1	7,900,000	4,900,000	--	--	--
2/17/66	1100	Grab	8	7.8	73	156	1030	46	40	<0.1	7,900,000	7,900,000	--	--	--
2/17/66	1430	Grab	10	7.8	96	201	975	64	58	<0.1	3,100,000	1,700,000	--	--	--
2/18/66	0930	Grab	9	7.7	57	120	945	25	22	<0.1	3,300,000	1,700,000	--	--	--
2/18/66	1130	Grab	11	7.9	72	160	990	46	46	<0.1	4,600,000	790,000	--	--	--
2/18/66	1330	Grab	11	7.9	73	171	940	50	47	<0.1	13,000,000	4,600,000	--	--	--
2/16/66		Comp	--	7.8	57	134	900	30	30	<0.1	--	--	3.0	--	--
2/17/66		Comp	--	7.8	63	165	955	51	45	<0.1	--	--	2.8	0.18	17.7
2/18/66		Comp	--	7.9	68	152	1000	58	41	<0.1	--	--	3.1	0.16	20.3
Average (Grabs)			8	7.8	64	140	968	40	37	<0.1	4,900,000	1,700,000			
Average (Composites)				7.8	63	150	952	46	39	<0.1			3.0	0.17	19.0
INFLUENT															
2/16/66	0900	Grab	8	7.6	147	222	1040	58	58	<0.1	--	--	--	--	--
2/16/66	1100	Grab	5	7.8	205	291	875	80	77	<0.1	--	--	--	--	--
2/16/66	1300	Grab	10	7.6	185	368	875	68	68	<0.1	--	--	--	--	--
2/16/66	1500	Grab	10	7.8	155	313	875	72	71	<0.1	--	--	--	--	--
2/17/66	0830	Grab	4	7.6	125	394	1100	135	128	0.2	--	--	--	--	--
2/17/66	1100	Grab	9	7.8	--	272	965	79	77	<0.1	--	--	--	--	--
2/17/66	1430	Grab	9	7.8	205	334	900	89	81	<0.1	--	--	--	--	--
2/18/66	0930	Grab	10	7.0	190	260	1070	86	73	0.3	--	--	--	--	--
2/18/66	1130	Grab	14	7.2	175	290	910	76	62	<0.1	--	--	--	--	--
2/18/66	1330	Grab	14	7.6	165	296	805	88	67	<0.1	--	--	--	--	--
2/16/66		Comp	--	7.8	235	445	860	218	208	7.0	--	--	4.0	--	--
2/17/66		Comp	--	7.8	248	577	1000	121	118	5.0	--	--	3.8	--	--
2/18/66		Comp	--	7.8	190	370	970	173	141	0.8	--	--	3.8	--	--
Average (Grabs)			9	7.6	172	304	942	83	90	<0.1					
Average (Composites)				7.8	224	464	943	171	156	4.3			3.9		
PERCENT REMOVALS (Composites)					72			73	75	>97					

LONGMONT SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
Supernatant
GRIT CHAMBER
Bypass
COMMINUTOR
PRIMARY CLARIFIER (85' Dia. x 8')
Sludge
PRIMARY DIGESTER (45' Dia. x 24'-9")
Bypass
Sludge
Drain
TRICKLING FILTER (90' Dia. x 5'-1")
SECONDARY DIGESTER (45' Dia. x 24'-9")
SECONDARY CLARIFIER (80' Dia. x 7')
CHLORINATOR
EFFLUENT
SLUDGE BEDS (18,400 sq. ft.)

LOUISVILLE SANITATION DISTRICT

Type of Treatment: Secondary-Contact Aeration
Population Served: 2250

The Louisville Sanitation District sewage treatment plant (see diagram) is located near the southeast corner of Louisville, and discharges effluent to Coal Creek, RM 270.0-17.4-7.9-13.7. The contact aeration system was constructed in 1951 to serve a population of 2500. The average daily flow to the plant is 0.147 MGD with a maximum observed flow of 0.249 MGD. Significant waste load is contributed by three restaurants that serve up to 10,000 meals during weekends.

No chlorination or laboratory facilities are available and it was reported that sludge removal from both the primary and final clarifiers was unsatisfactory due to improper design and lack of sludge removal equipment. The septic sludge in the clarifiers causes local odors and inhibits settling in the clarifiers.

The contact aeration unit, with a detention time of two hours, has contact media of 1/4" thick asbestos sheets placed vertically in the tank at 1-1/2" spacing. Air is introduced to the tank through diffusers below the media. At the time of sampling, it was observed that 1) most of the asbestos sheets were out of position; 2) a great deal of sludge had accumulated in the hoppers at the bottom of the tank, and 3) sufficient air was not being supplied. It also appeared the digester is inadequately sized. A consulting firm is preparing recommendations for needed improvements in the treatment system. Major modifications to the existing plant appear necessary, as does the need for proper operation and maintenance.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml
5/24/66 1040	7.4	185	299	96	87	2.0	33×10^{6}	4.9×10^{6}
5/25/66 1215	7.5	170	340	105	88	2.0	130×10^{6}	2.9×10^{6}
5/26/66 1330	7.0	190	618	191	165	2.0	23×10^{6}	1.4×10^{6}

LYONS SANITATION DISTRICT

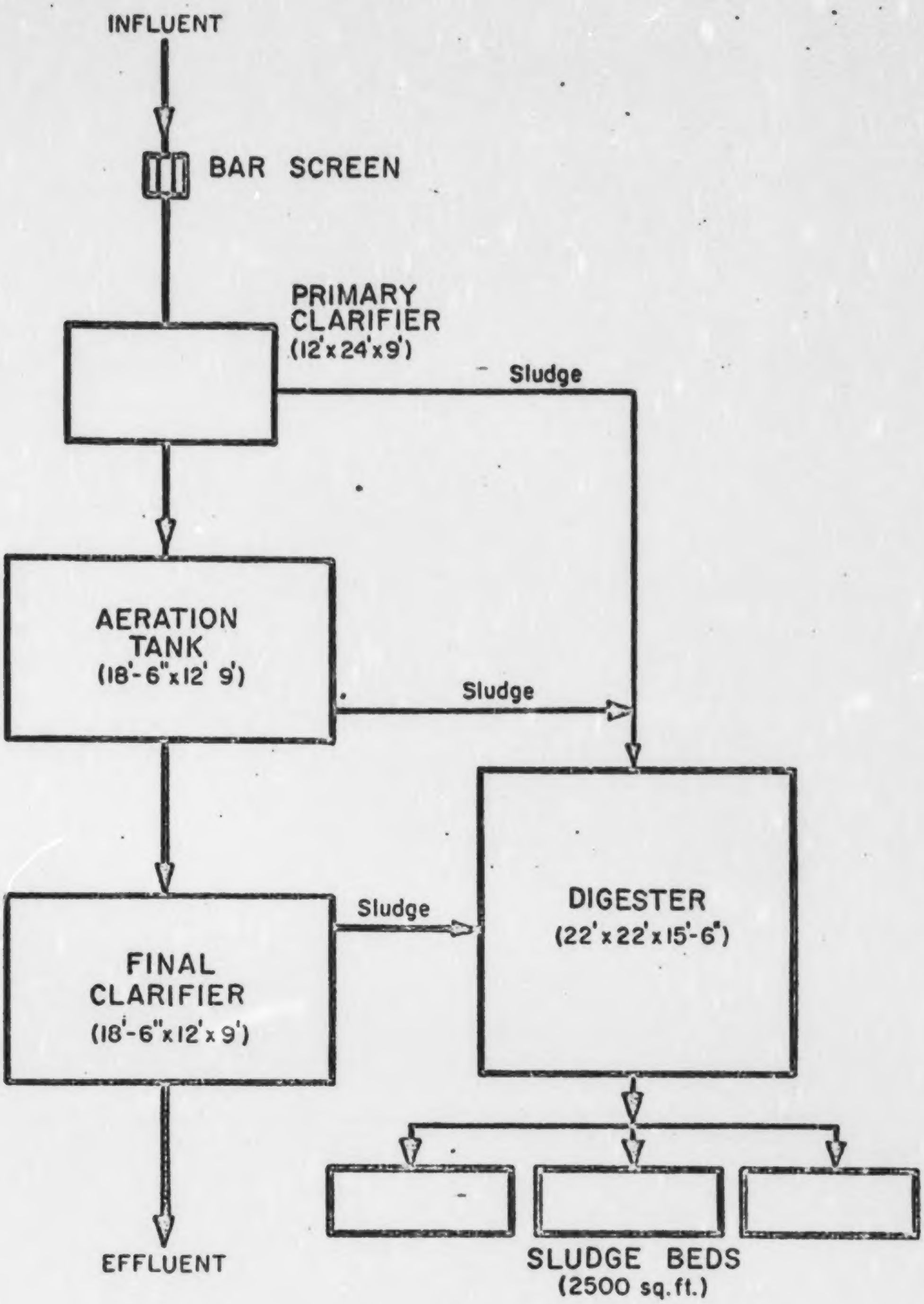
Type of Treatment: Primary-Clarigester
Population Served: 800

The Lyons Sanitation District sewage treatment plant (see diagram) is located about one-fourth of a mile east of town and discharges effluent to St. Vrain Creek, RM 270.0-34.3. The plant was constructed in 1952 for a population of 1430, and recently treats an average flow of 65,000 gpd. The waste load is primarily domestic. However, the high COD, TSS, and VSS concentrations, as well as the appearance of the influent, indicates substantial amounts of grease in the system originating from wool washing operations of a local rug manufacturer.

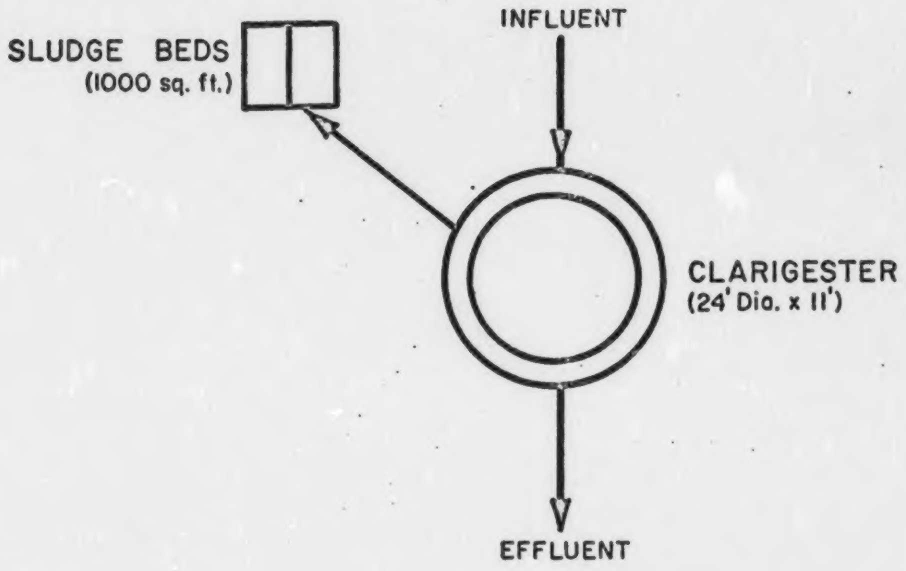
SAMPLING DATA
LYONS SANITATION DISTRICT SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
6/21/66	0800	Grab	20	6.8	36	76	222	39	38	0.1	11,000,000	1,300,000	--
6/21/66	1100	Grab	21	6.9	120	134	261	37	37	<0.1	22,000,000	950,000	--
6/21/66	1300	Grab	21	7.0	80	150	275	32	29	<0.1	22,000,000	1,300,000	--
6/22/66	1200	Grab	19	6.8	60	108	255	36	35	<0.1	13,000,000	1,100,000	--
6/22/66	1400	Grab	20	6.8	80	976	262	44	41	0.1	7,900,000	1,300,000	--
6/22/66	1500	Grab	19	6.8	73	156	255	91	80	<0.1	7,000,000	1,100,000	--
6/23/66	0900	Grab	20	6.9	34	50	228	20	20	<0.1	8,400,000	1,100,000	--
6/23/66	1000	Grab	20	7.0	54	100	244	34	32	0.1	11,000,000	790,000	--
6/23/66	1100	Grab	21	7.0	67	116	238	41	41	0.2	33,000,000	1,300,000	--
6/21/66		Comp	--	7.0	43	104	268	84	79	<0.1	--	--	1.4
6/22/66		Comp	--	6.8	59	106	244	39	34	<0.1	--	--	1.5
6/23/66		Comp	--	6.9	56	102	244	39	39	0.1	--	--	2.0
Average (Grabs)			20	6.9	67	207	249	41	39	<0.1	11,000,000	1,100,000	
Average (Composites)				6.9	53	104	252	54	51	<0.1			1.6
INFLUENT													
6/21/66	0800	Grab	20	6.8	100	560	282	98	88	2.5	--	--	--
6/21/66	1100	Grab	21	6.8	150	2170	238	--	--	--	--	--	--
6/21/66	1300	Grab	21	6.8	180	1216	238	2048	2028	1.2	--	--	--
6/22/66	1200	Grab	19	7.1	91	1024	268	414	396	2.5	--	--	--
6/22/66	1400	Grab	20	6.9	103	718	228	352	346	1.0	--	--	--
6/22/66	1500	Grab	19	6.8	54	848	214	2260	2222	0.5	--	--	--
6/23/66	0900	Grab	--	6.9	140	462	268	756	754	2.5	--	--	--
6/23/66	1000	Grab	20	6.8	180	3340	290	4638	4584	20.0	--	--	--
6/23/66	1100	Grab	21	6.9	220	242	250	192	188	3.0	--	--	--
6/21/66		Comp	--	6.9	155	740	255	1386	1368	2.5	--	--	2.3
6/22/66		Comp	--	6.9	113	540	228	918	908	3.0	--	--	1.9
6/23/66		Comp	--	6.9	170	1875	250	2196	2177	4.5	--	--	3.2
Average (Grabs)			18	6.9	135	1176	253	1195	1179	3.7			
Average (Composites)				6.9	146	1052	244	1500	1484	3.4			2.5
PERCENT REMOVALS (Composites)					64			96	96	>97			

LOUISVILLE SANITATION DISTRICT SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
PRIMARY CLARIFIER (12'x24'x9')
Sludge
AERATION TANK (18'-6"x12' 9')
Sludge
FINAL CLARIFIER (18'-6"x12'x9')
Sludge
DIGESTER (22'x22'x15'-6")
EFFLUENT
SLUDGE BEDS (2500 sq.ft.)

LYONS SANITATION DISTRICT
SEWAGE TREATMENT PLANT


SLUDGE BEDS
(1000 sq. ft.)
INFLUENT
CLARIGESTER
(24' Dia. x 11')
EFFLUENT

A part-time operator devotes about six hours per week operating and maintaining this facility. No laboratory analyses are performed. Additional treatment facilities including disinfection and improved operation are necessary.

PRICE'S MESA MANOR TRAILER COURT

Type of Treatment: Secondary-Extended Aeration
Population Served: 130

Price's Mesa Manor Trailer Court is located two miles south of Boulder adjacent to State Highway 93. The treatment plant is located on the east side of the site and discharges to a ditch, RM 270.0-17.4-20.7-5.9-0.7-0.2. A Yeoman "Yeowave" package plant was installed in 1964. The waste is entirely domestic with an average flow of about 10,000 gpd. Under normal flow conditions the effluent would not reach a stream. However, at high flows the effluent may enter into an irrigation canal which receives water from South Boulder Creek.

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
EFFLUENT									
7/5/66 1500	7.3	95	201	102	98	1.0	7.9×10^6	3.3×10^6	4.3
7/6/66 1300	7.6	76	207	93	90	0.6	22.0×10^6	11.0×10^6	1.9
INFLUENT									
7/5/66 1500	6.9	280	652	186	186	4.0	--	--	3.2
7/6/66 1300	7.6	225	438	131	131	0.2	--	--	1.0

Clear Creek County

BERTHOUD PASS LODGE

Type of Treatment: Secondary-Extended Aeration
Population Served: Varies

The Berthoud Pass Lodge serves tourists and other travelers year-round. It primarily facilitates the Berthoud Pass Ski Area, which is open weekends and holidays during the skiing season. The Lodge is located in the Arapahoe National Forest adjacent to U. S. Highway 40 at the summit of Berthoud Pass. A 15,000 gpd extended aeration package plant with chlorination facilities followed by a polishing pond was recently installed. Effluent from the plant discharges to Hoop Creek, RM 311.1-47.5-7.3-1.7. The waste load is contributed by a restaurant and sanitary facilities.

GENEVA BASIN SKI AREA

Type of Treatment: Secondary-Extended Aeration
Population Served: Varies

The Geneva Basin Ski Area, operated by the Geneva Basin Ski Corporation, is located approximately ten miles northwest of Grant in the Pike National Forest. Effluent from the sewage treatment plant (see diagram) discharges to Duck Creek, RM 350.8-39.1-6.9-3.5, a tributary of Geneva Creek which flows into the North Fork of the South Platte River. Restaurant and sanitary facilities are operated daily during the skiing season and serve up to 700 people per day. The extended aeration package plant, with a capacity of 9,200 gpd, was installed in 1961.

GEORGETOWN

Type of Treatment: None
Population: 500

Georgetown discharges untreated sewage to Clear Creek, RM 311.1-50.0. Approximately 50 percent of the population is served by a sewer system. A preliminary engineering report was recently submitted to the State Water Pollution Control Commission. The Town has made application for construction of a sewer collection and treatment system.

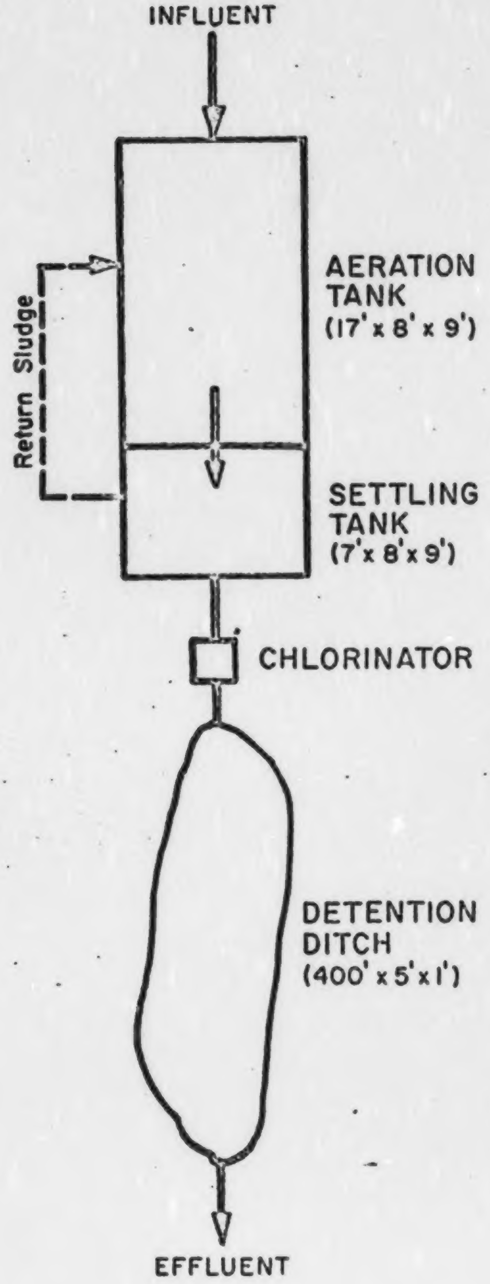
IDAHO SPRINGS

Type of Treatment: Secondary-Trickling Filter
Population Served: 2500

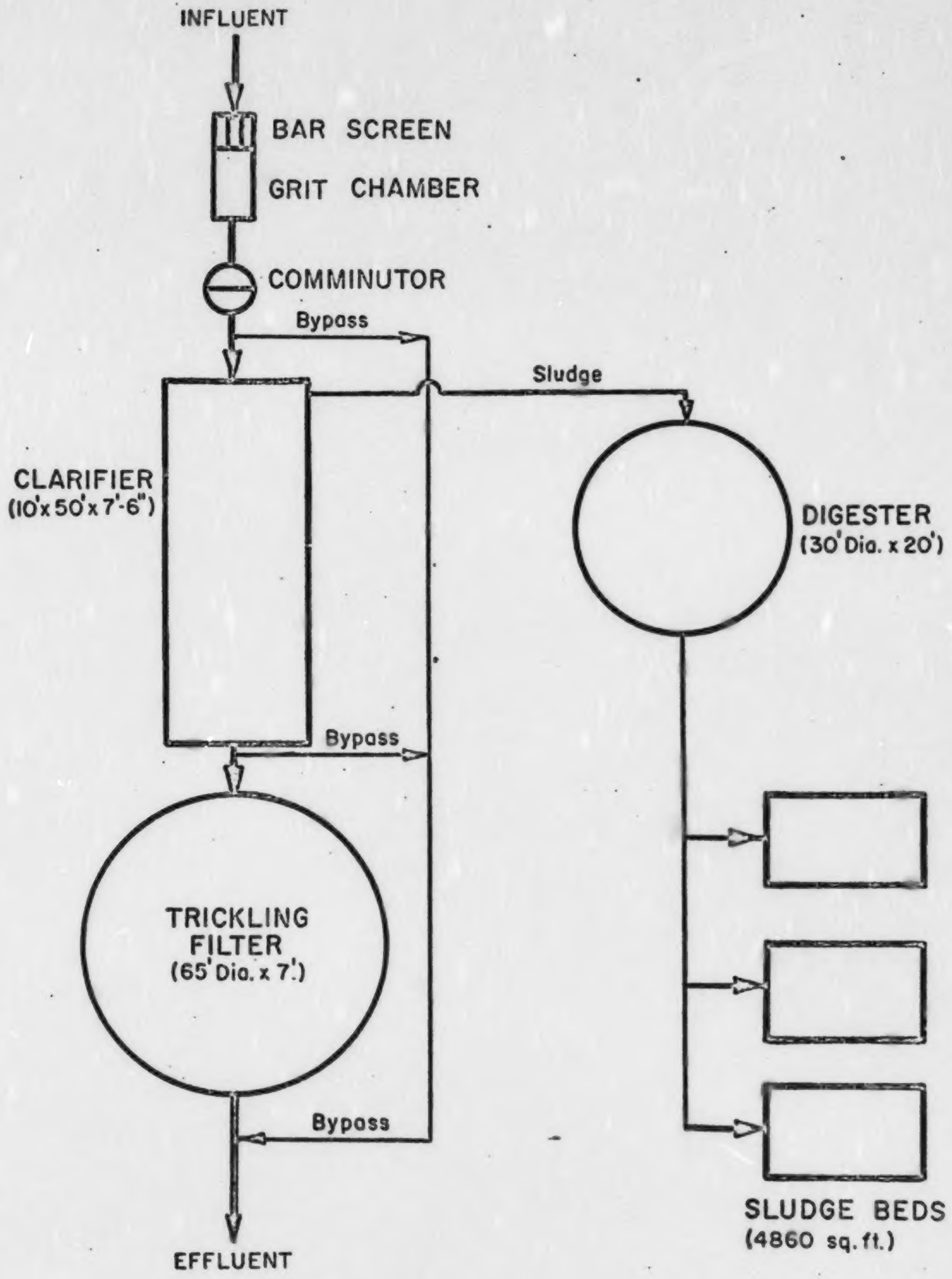
The Idaho Springs sewage treatment works (see diagram) is located adjacent to U. S. Highways 6 and 40 about one-half mile east of the community, and discharges effluent to Clear Creek, RM 311.1-36.8. The plant, constructed in 1956, provides treatment for an average flow of about 0.28 MGD. One man, assigned as operator, makes daily visits to the facility. The trickling filter has not been completely filled with media. The plant effluent line (installed at a shallow depth) was located under one of the sludge drying beds, thereby permitting possible infiltration of drainage liquor. After removal from the drying beds, the sludge was piled along the banks of Clear Creek. Additional treatment facilities including disinfection are needed. An acceptable method of sludge disposal must be found.

Analyses of sampling data are given in the table on pages 33-34.

GENEVA BASIN SKI AREA SEWAGE TREATMENT PLANT


INFLUENT
AERATION TANK (17' x 8' x 9')
Return Sludge
SETTLING TANK (7' x 8' x 9')
CHLORINATOR
DETENTION DITCH (400' x 5' x 1')
EFFLUENT

IDAHO SPRINGS
SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
GRIT CHAMBER
COMMINUTOR
Bypass
Sludge
CLARIFIER
(10'x 50'x 7'-6")
DIGESTER
(30' Dia. x 20')
Bypass
TRICKLING
FILTER
(65' Dia. x 7')
Bypass
EFFLUENT
SLUDGE BEDS
(4860 sq. ft.)

SAMPLING DATA
IDAHO SPRINGS SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
5/03/66	0900	Grab	12	7.7	33	116	910	53	41	0.5	4,900,000	1,100,000	--
5/03/66	1100	Grab	14	7.7	69	142	765	52	41	0.5	2,300,000	1,300,000	--
5/03/66	1400	Grab	15	7.6	60	132	795	48	37	0.2	460,000	330,000	--
5/04/66	0800	Grab	12	7.8	59	92	1000	51	39	0.5	3,300,000	3,300,000	--
5/04/66	1000	Grab	14	7.8	72	114	1000	51	41	0.5	1,700,000	1,100,000	--
5/04/66	1300	Grab	16	7.7	70	126	845	46	37	0.4	2,200,000	790,000	--
5/05/66	1000	Grab	14	7.5	77	154	905	55	41	0.6	7,000,000	2,200,000	--
5/05/66	1200	Grab	15	7.8	81	136	795	48	33	0.4	4,900,000	4,900,000	--
5/05/66	1500	Grab	16	7.8	62	130	820	53	38	0.3	4,600,000	460,000	--
5/01/66		Comp	--	7.6	61	130	820	48	38	0.1	--	--	2.6
5/04/66		Comp	--	7.8	52	106	940	45	36	0.4	--	--	2.3
5/05/66		Comp	--	7.8	95	150	860	70	51	0.6	--	--	2.4
Average (Grabs)			14	7.7	65	127	871	51	39	0.4	3,300,000	1,100,000	
Average (Composites)				7.7	69	129	873	54	42	0.4			2.6
INFLUENT													
5/03/66	0900	Grab	15	7.2	152	323	850	138	118	4.5	--	--	--
5/03/66	1100	Grab	16	7.2	135	263	790	110	87	3.5	--	--	--
5/03/66	1400	Grab	15	7.2	140	261	775	233	224	4.0	--	--	--
5/04/66	0800	Grab	13	7.2	175	319	1030	168	146	10.0	--	--	--
5/04/66	1000	Grab	16	7.2	260	480	840	210	171	8.5	--	--	--
5/04/66	1300	Grab	15	7.3	138	198	940	70	58	4.0	--	--	--
5/05/66	1000	Grab	16	7.1	190	270	815	131	112	5.0	--	--	--
5/05/66	1200	Grab	16	7.2	195	345	800	118	90	4.0	--	--	--
5/05/66	1500	Grab	15	7.2	220	411	880	161	146	4.0	--	--	--
5/03/66		Comp	--	7.3	118	245	795	103	93	3.0	--	--	6.3
5/04/66		Comp	--	7.3	158	285	925	95	82	3.5	--	--	4.7
5/05/66		Comp	--	7.4	170	367	845	96	77	3.5	--	--	5.2
Average (Grabs)			15	7.2	178	319	858	149	128	5.3			
Average (Composites)				7.3	149	299	855	98	84	3.3			5.4
PERCENT REMOVALS (Composites)					54			45	50	88			

SAMPLING DATA (continued)
IDAHO SPRINGS SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
7/12/66	0800	Grab	19	7.8	72	137	932	80	67	2.0	12,000,000	700,000	--
7/12/66	1000	Grab	19	7.8	56	108	975	44	39	0.3	3,100,000	1,300,000	--
7/12/66	1400	Grab	19	7.8	56	149	894	34	32	<0.1	2,200,000	1,300,000	--
7/13/66	0900	Grab	18	7.7	60	122	1120	43	35	0.5	17,000,000	7,900,000	--
7/13/66	1200	Grab	19	7.9	62	145	959	54	31	0.3	3,300,000	3,300,000	--
7/13/66	1400	Grab	19	7.9	185	384	994	148	98	0.5	33,000,000	1,700,000	--
7/14/66	1100	Grab	19	7.6	65	123	1085	59	54	0.7	7,000,000	1,700,000	--
7/14/66	1300	Grab	19	7.5	67	123	957	46	44	0.4	13,000,000	3,300,000	--
7/14/66	1500	Grab	20	7.3	57	123	957	39	38	0.5	3,300,000	790,000	--
7/12/66		Comp	--	7.9	67	116	941	45	40	0.2	--	--	3.1
7/13/66		Comp	--	7.9	77	181	970	65	54	0.5	--	--	1.7
7/14/66		Comp	--	7.6	52	266	994	39	39	0.2	--	--	2.8
Average (Grabs)			19	7.7	76	157	986	61	49	<0.6	7,000,000	1,700,000	
Average (Composites)				7.8	65	188	968	50	44	0.3			2.5
INFLUENT													
7/12/66	0800	Grab	19	7.4	114	281	932	102	96	5.5	--	--	--
7/12/66	1000	Grab	19	7.4	195	452	732	208	200	8.0	--	--	--
7/12/66	1400	Grab	20	7.5	81	207	894	66	66	6.0	--	--	--
7/13/66	0900	Grab	19	6.9	130	289	975	124	114	6.5	--	--	--
7/13/66	1200	Grab	20	7.2	162	366	959	142	118	5.5	--	--	--
7/13/66	1400	Grab	19	7.3	140	261	895	264	256	5.0	--	--	--
7/14/66	1100	Grab	19	7.0	148	488	1007	182	172	8.5	--	--	--
7/14/66	1300	Grab	20	7.2	160	323	925	112	108	4.2	--	--	--
7/14/66	1500	Grab	20	6.8	91	210	975	84	82	3.5	--	--	--
7/12/66		Comp	--	7.6	232	364	950	164	152	5.0	--	--	6.6
7/13/66		Comp	--	7.6	140	307	941	162	138	5.0	--	--	2.3
7/14/66		Comp	--	7.1	158	292	994	121	106	6.5	--	--	5.9
Average (Grabs)			20	7.2	136	320	922	143	135	5.9			
Average (Composites)				7.4	177	321	962	149	132	5.5			4.9
PERCENT REMOVALS (Composites)					64			66	67	95			

LOVELAND BASIN SKI AREA

Type of Treatment: Secondary-Extended Aeration
Population Served: Varies

The Loveland Basin Ski Area, operated by the Loveland Ski Tow Company, is located about three and one-half miles from the Continental Divide, Loveland Pass, adjacent to U. S. Highway 6 on the eastern slope of the Rocky Mountains in Arapahoe National Forest. Effluent from the sewage treatment plant (see diagram) discharges to Clear Creek, RM 311.1-62.9.

The extended aeration package plant was installed in 1961. Waste load to the plant is contributed by a restaurant and sanitary facilities that serve up to 4,000 people per week during the skiing season.

Based on available information, it would appear that solids carryover was a problem at the time of the 1966 sampling and that disinfection was not adequate.

Effluent Data -- State Department of Public Health

Date Time	BOD mg/l	TSS mg/l	Total Coli. /100 ml
12/29/65 1040	17	32	4,300
12/29/65 1400	21	25	1.1×10^{6}
3/24/66 1050	13	-	36,000
3/24/66 1240	30	85	91,000

LOVELAND VALLEY SKI AREA

Type of Treatment: Secondary-Extended Aeration
Population Served: Varies

The Loveland Valley Ski Area, also operated by the Loveland Ski Tow Company, is located approximately two miles northeast of Loveland Basin Ski Area adjacent to U. S. Highway 6. The ski area is operated on weekends and holidays, only. The extended aeration package plant was installed in 1961 (see diagram) and discharges effluent to Clear Creek, RM 311.1-60.6.

RUNYAN SUBDIVISION SANITATION DISTRICT

Type of Treatment: Primary-Septic Tank
Population Served: 100

The Runyan Subdivision, located on the west side of Sheridan Blvd. between 10th and 11th Avenues, was annexed to the City and County of Denver in 1964. Effluent from the septic tank, about 5,600 gpd, discharges to Dry Gulch, RM 318.9-1.2-1.0. An interceptor sewer will connect this area to the Denver sewer system during the latter part of 1967.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	Cl Res mg/l
12/13/66 0900	7.3	119	292	39	33	0.1	130	<1.8	0.7

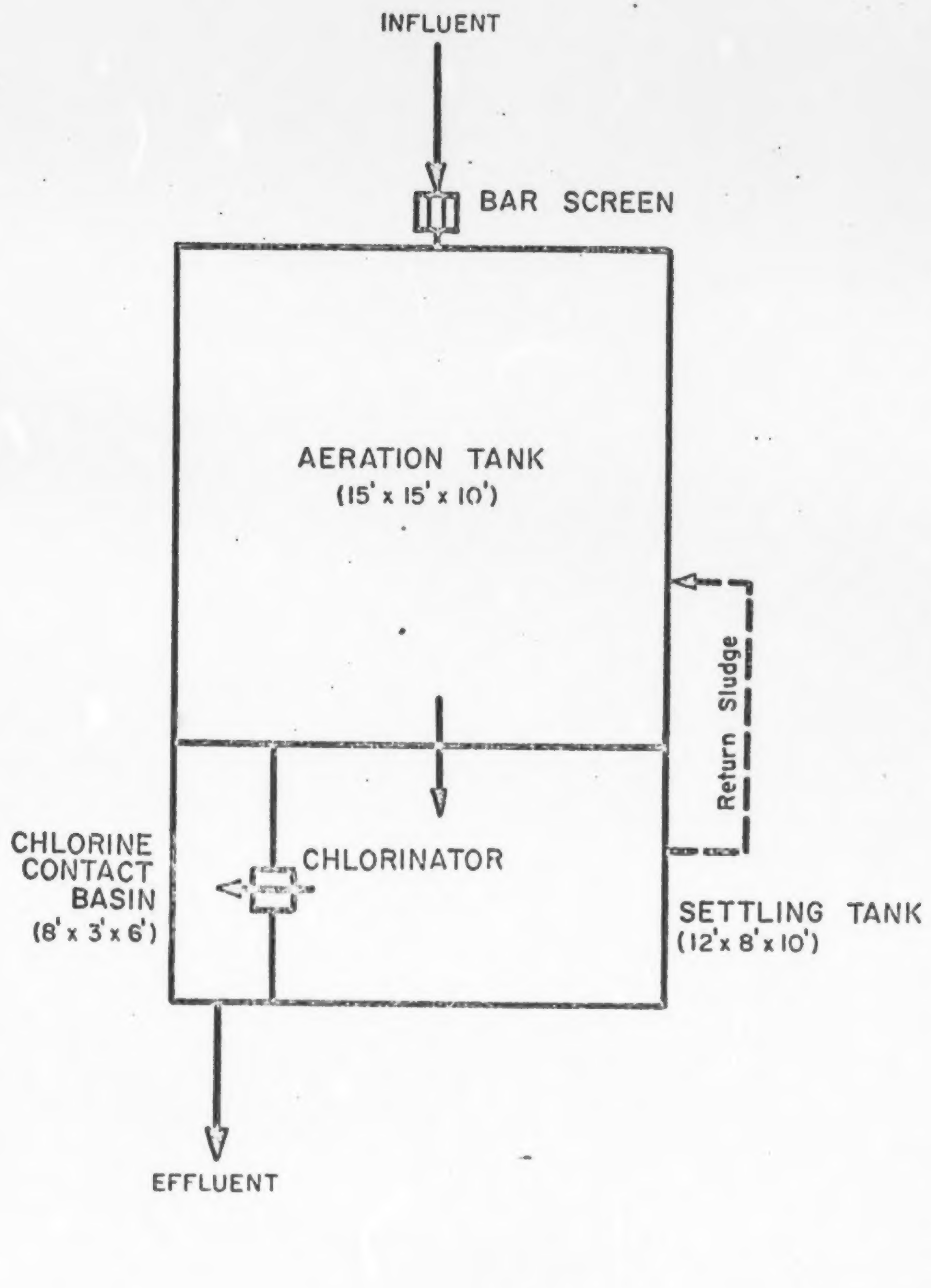
CASTLE ROCK

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 1300

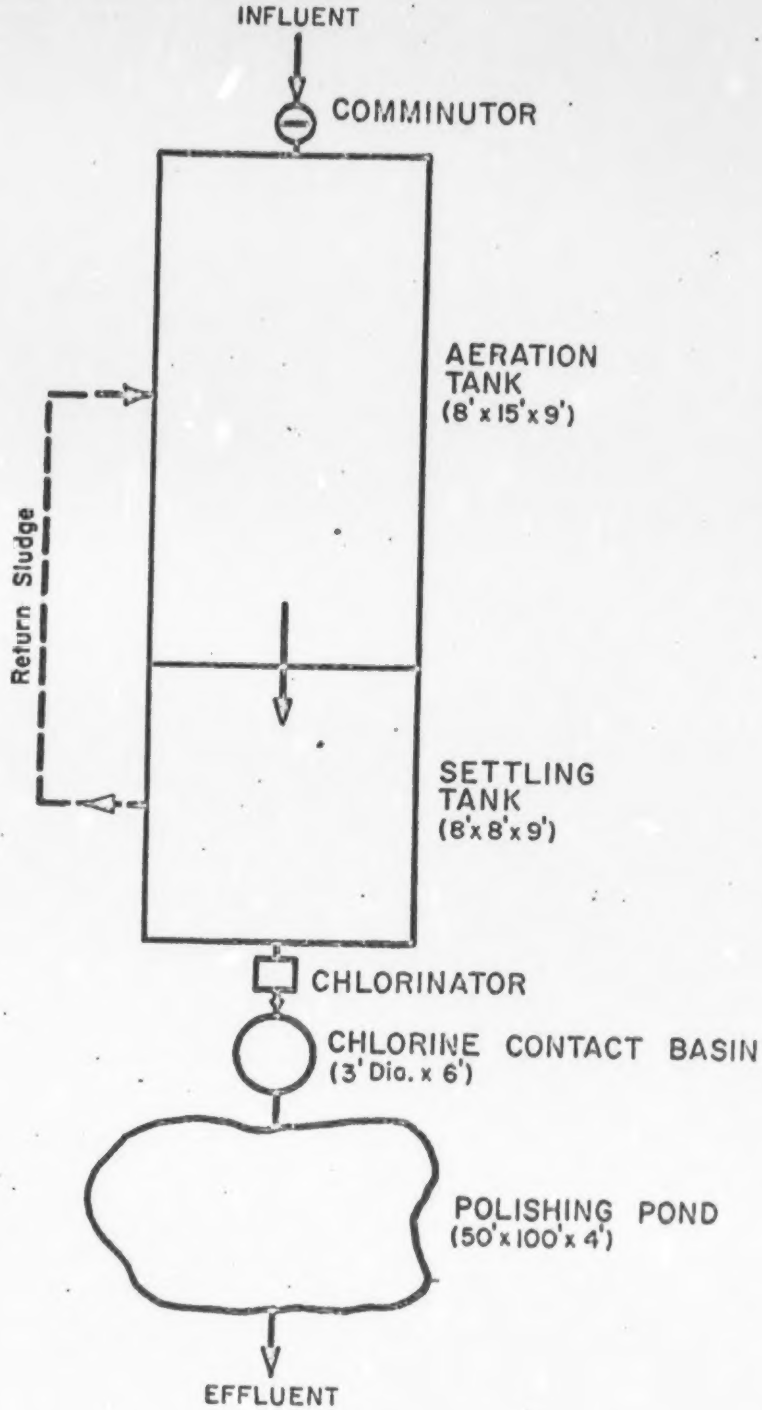
The Castle Rock treatment facilities are located one-half mile north of the community on the west side of U. S. Highway 87 and consist of four lagoons, two on the west side of East Plum Creek, and two located on the east side. When overflowing, the effluent discharges to East Plum Creek, RM 335.5-12.7L-8.5. Two ponds were constructed in 1962 and the other two in 1963. One was destroyed by the 1965 flood and replaced in 1966. Total surface area approximates 11 acres. The lagoons and appurtenances were adequately maintained.

A part-time operator makes daily visits and devotes approximately ten hours per week in the operation and maintenance of facilities. No laboratory analyses are performed. On June 28 and 29, 1966, and March 2, 1967, the lagoons were not discharging to the Creek. The operator indicated the ponds overflow for about a one-month period during mid-summer. Sufficient land has been purchased to construct an additional five-acre lagoon when required.

LOVELAND BASIN SKI AREA SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
AERATION TANK
(15' x 15' x 10')
Return Sludge
CHLORINE
CONTACT
BASIN
(8' x 3' x 6')
CHLORINATOR
SETTLING TANK
(12' x 8' x 10')
EFFLUENT

LOVELAND VALLEY SKI AREA SEWAGE TREATMENT PLANT


INFLUENT
COMMINUTOR
AERATION TANK
(8' x 15' x 9')
Return Sludge
SETTLING TANK
(8' x 8' x 9')
CHLORINATOR
CHLORINE CONTACT BASIN
(3' Dia. x 6')
POLISHING POND
(50' x 100' x 4')
EFFLUENT

CONTINENTAL DIVIDE RACE TRACK

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: Varies

The Continental Divide Race Track is located on the west side of U. S. Highway 87 about two miles south of Castle Rock near East Plum Creek, RM 335.5-12.7L-10.8. The track is operated during the summer and autumn months only and is served by two waste stabilization ponds constructed in 1959. Total surface area of the ponds approximates one-half acre. Difficulty in maintaining a proper liquid depth has been encountered. No overflow from the lagoons has occurred.

LOUVIERS WATER, SANITATION, AND FIRE DISTRICT

Type of Treatment: Secondary-Imhoff Tank and Fixed Trickling Filter
Population Served: 325

The Louviers Water, Sanitation, and Fire District sewage treatment plant (see diagram), located north of the community, releases effluent to Plum Creek, RM 335.5-7.3. Approximately 26,000 gpd of domestic wastes are treated. One man devotes about twelve hours per week to the operation and maintenance of the system. No laboratory analyses are performed. A polishing pond is reported in the planning stages.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	Cl Res mg/l
12/13/66 1130	7.8	48	169	24	19	<0.1	7.8	<1.8	5.0

PARKER HEIGHTS WATER AND SANITATION DISTRICT

Type of Treatment: Secondary-Extended Aeration
Population Served: 70

The Parker Heights Water and Sanitation District treatment plant (see diagram) is located one mile north of the community and west of State Highway 83 adjacent to Cherry Creek, RM 317.7-24.0. The extended aeration package plant, followed by a leaching pit, was installed in 1962 and serves about 20 homes. A second pit was added in series in 1966. No discharge was observed from the facility.

SILVER HEIGHTS WATER AND SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Pond
Population Served: 100

The Silver Heights Water and Sanitation District sewage lagoon is located near East Plum Creek, RM 335.5-12.7L-6.2 approximately two miles north of Castle Rock on the west side of U. S. Highway 87. The pond was constructed in 1962 and serves the Silver Heights Subdivision located on the east side of the highway. To date, there has been no discharge from the 1.5 acre stabilization pond.

Gilpin County

BLACKHAWK

Type of Treatment: None
Permanent Population: 200

Blackhawk discharges untreated sewage to North Clear Creek, RM 311.1-30.0-7.2, a tributary of Clear Creek. About 40 percent of the residences have private disposal systems and the remaining wastes are discharged directly to North Clear Creek or Gregory and Chase Gulches, tributaries of North Clear Creek. Clear Creek is a source of municipal water supply for several downstream communities. About 200 people maintain permanent residences in Blackhawk and during the summer months, large numbers of tourists visit the town daily.

A preliminary engineering report was recently submitted to the State Water Pollution Control Commission.

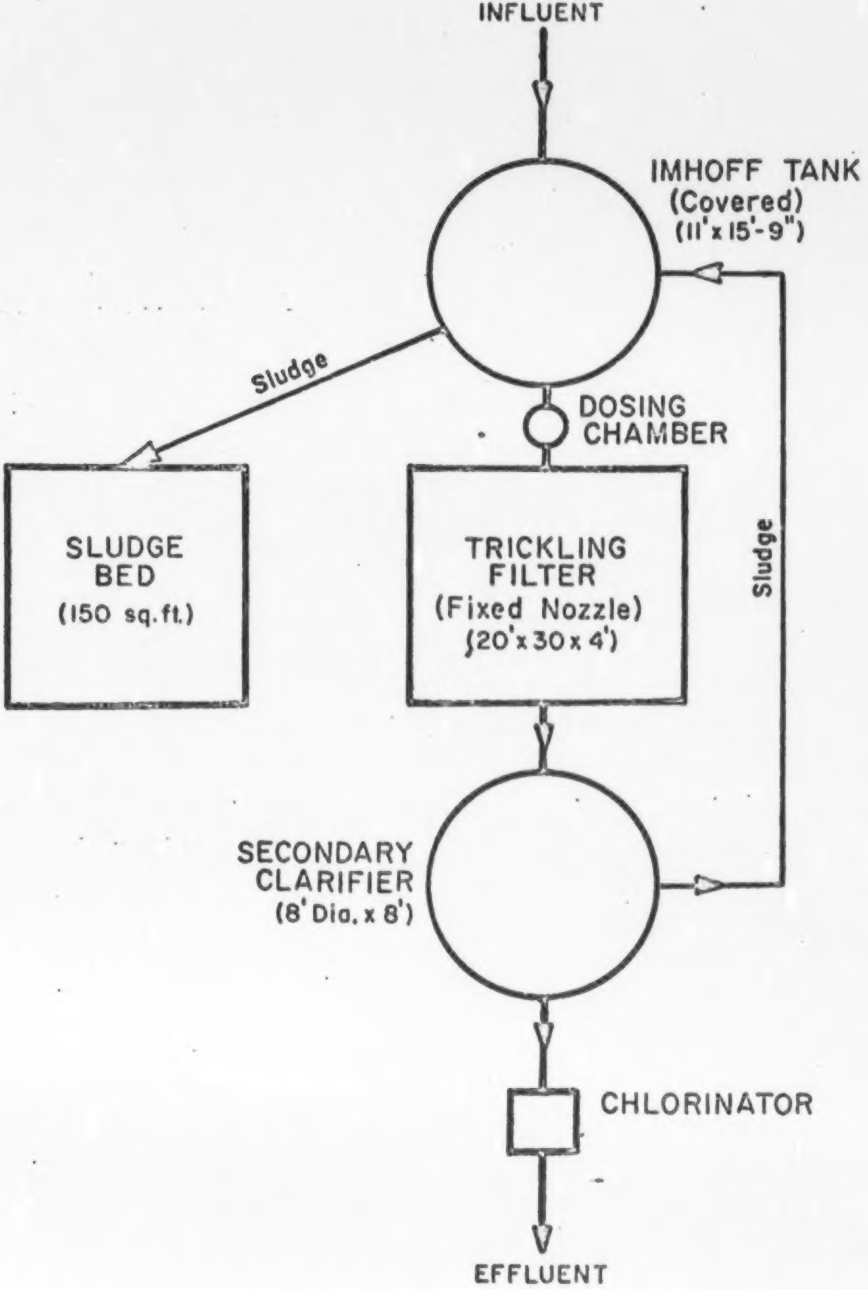
CENTRAL CITY

Type of Treatment: None
Permanent Population: 275

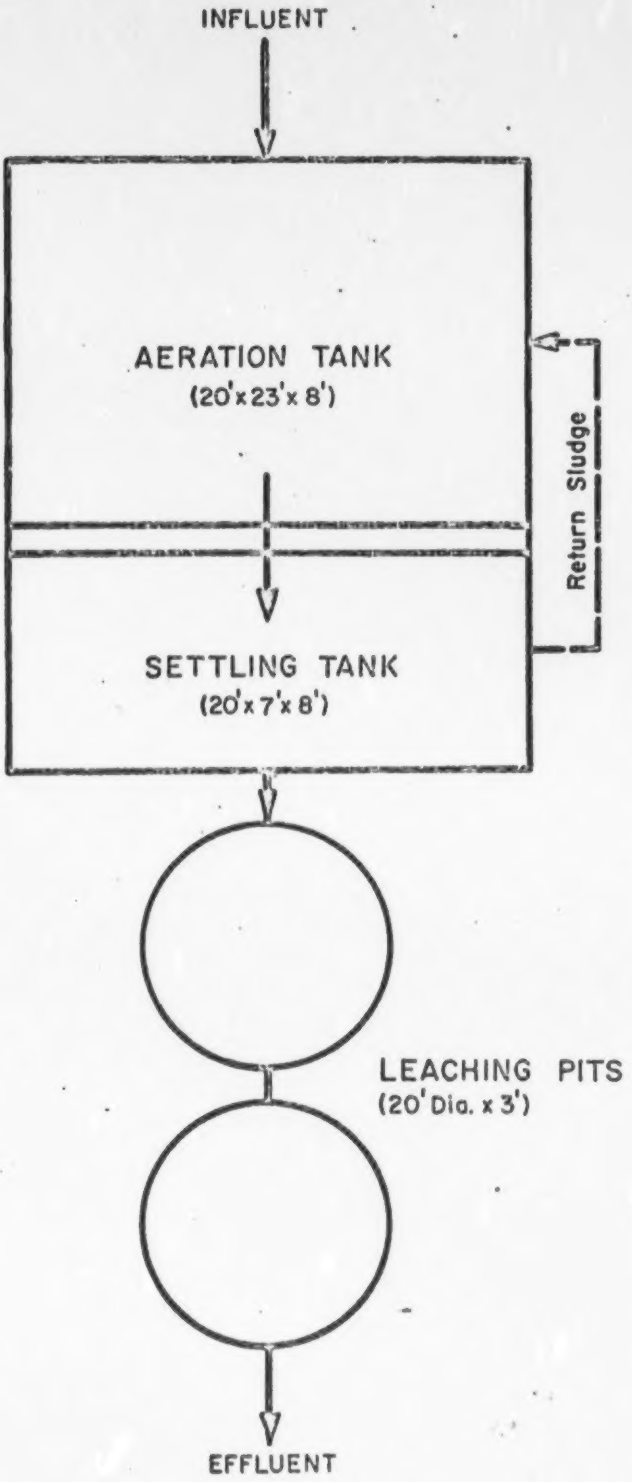
Central City discharges untreated sewage to Gregory Gulch, RM 311.1-30.0-7.4-0.5, a tributary of North Clear Creek. Approximately 25 percent of the residences have private disposal systems. The remainder of the waste from the community is discharged from some fifty separate lines to Gregory Gulch or its tributaries, Eureka, Nevada, and Spring Gulches.

About 5,000 to 10,000 tourists visit the community daily during the summer tourist season. Central City has submitted a preliminary engineering study to the State Water Pollution Control Commission.

LOUVIERS WATER, SANITATION AND FIRE DISTRICT
SEWAGE TREATMENT PLANT


INFLUENT
IMHOFF TANK
(Covered)
(11'x 15'-9")
Sludge
DOSING
CHAMBER
SLUDGE
BED
(150 sq.ft.)
TRICKLING
FILTER
(Fixed Nozzle)
(20'x 30 x 4')
Sludge
SECONDARY
CLARIFIER
(8' Dia. x 8')
CHLORINATOR
EFFLUENT

PARKER HEIGHTS SUBDIVISION
SANITATION DISTRICT
SEWAGE TREATMENT PLANT


INFLUENT
AERATION TANK
(20'x 23'x 8')
Return Sludge
SETTLING TANK
(20'x 7'x 8')
LEACHING PITS
(20' Dia. x 3')
EFFLUENT

EL RANCHO RESTAURANT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: Varies

The El Rancho Restaurant, located 27 miles west of Denver near the junction of U. S. Highway 40 and State Highway 74, is served by two waste stabilization ponds connected in series having a surface area of one-half acre each. The lagoons were not overflowing when visited. The restaurant is open seven days a week and serves approximately 1200 meals per week during the winter months and about 2200 meals per week during the summer months.

KITTREDGE

Type of Treatment: Secondary-Extended Aeration
Population Served: 300

Kittredge placed into operation a 100,000 gpd plant during the spring of 1967. The system, located about one-half mile east of the community, adjacent to State Highway 74, discharges effluent to Bear Creek, RM 326.4-19.2. Treatment is accomplished by the extended aeration process, disinfection of the effluent, and retention in a polishing pond before release to the creek. Laboratory equipment is provided in performance of basic analyses necessary for proper control.

MOUNTAIN VALLEY TRAILER COURT

Type of Treatment: Secondary-Extended Aeration
Population Served: 300

The Mountain Valley Trailer Court is located 2.5 miles east of Morrison adjacent to U. S. Highway 285. The plant effluent discharges to Bear Creek, RM 326.4-8.6. A Yeoman "Yeowave" package plant with a capacity of 30,000 gpd serves the trailer court. The plant (see diagram) was placed in operation the summer of 1964. Average flow from the 110 unit court is 17,000 gpd.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
6/30/66 1500	7.5	32	81	52	48	<0.1	22.0×10^6	3.3×10^6	0.9
7/5/66 1400	7.7	62	201	90	82	2.0	11.0×10^6	790,000	0.6
12/12/66 1300	7.6	7	74	45	14	0.2	3,500	230	0.1

MOUNT VERNON COUNTRY CLUB

Type of Treatment: Secondary-Extended Aeration
Population Served: Varies

The Mount Vernon Country Club, a private club located 24 miles west of Denver and about one-half mile north of U. S. Highway 40 near Genessee Mountain, is served by a package treatment plant situated north of the Club House. Effluent is discharged to an intermittent stream, RM 311.1-20.5-1.5, tributary to Clear Creek. Under normal conditions it is doubtful if any effluent reaches Clear Creek. The plant, serving 800 to 1000 people on weekends, is operated and maintained by Club personnel. Routine visits to the facility are made twice daily. Adequate disinfection is not provided.

Effluent Data

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml
12/12/66 1045	7.8	21	50	13	8	<0.1	490,000	330,000

SHERIDAN MOBILE PARK

Type of Treatment: Primary-Septic Tank
Population Served: 600

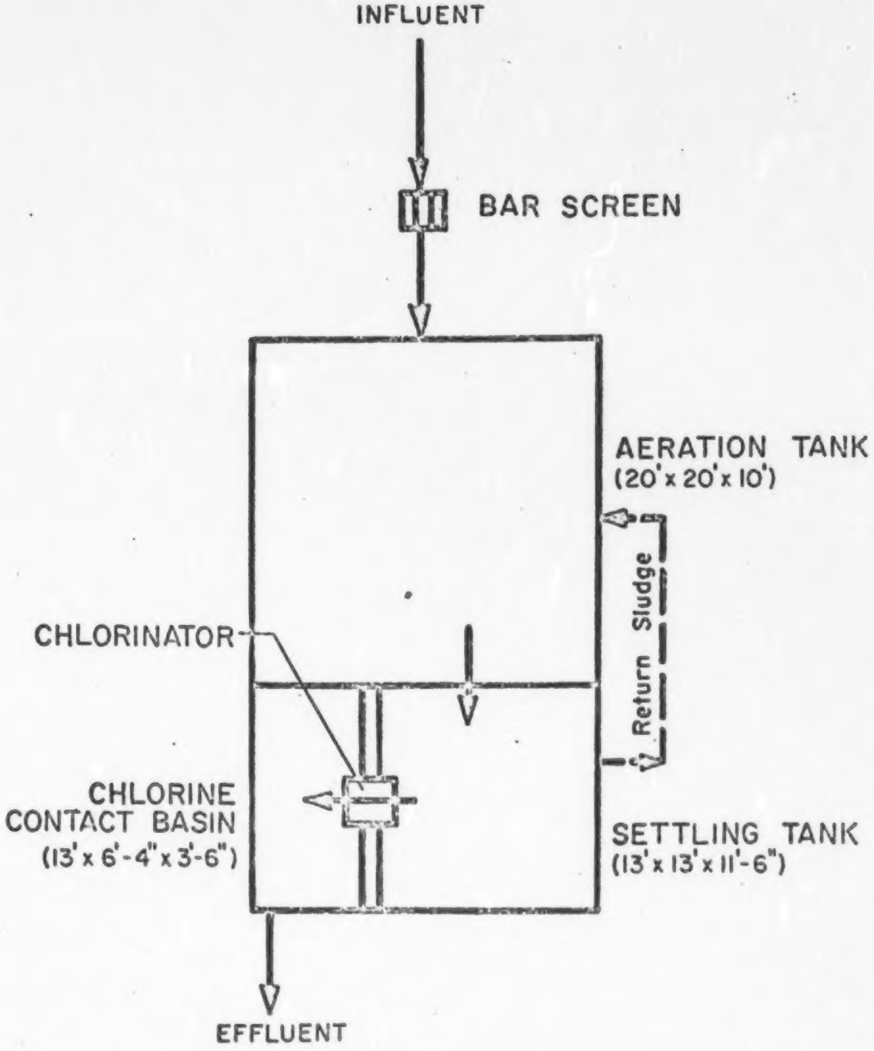
The Sheridan Mobile Park is located at 5305 Sheridan Blvd., about one-half mile south of Clear Creek, RM 311.1-6.6. Approximately 250 trailers are served by a septic tank followed by two leaching fields. There was no apparent discharge to a surface stream. Sheridan Mobile Park and other small businesses in the area are negotiating to connect with the Arvada sewer collection system.

STANDLEY LAKE WATER AND SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Pond
Population Served: 80

The Standley Lake Water and Sanitation District serves a small housing development and operates a waste stabilization pond located about two miles south of the Broomfield interchange, Denver-Boulder Turnpike. The lagoon, completed in April 1965 and located on the east side of the highway has not overflowed since being placed in service.

MOUNTAIN VALLEY TRAILER COURT
SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
AERATION TANK
(20' x 20' x 10')
Return Sludge
CHLORINATOR
CHLORINE
CONTACT BASIN
(13' x 6'-4" x 3'-6")
SETTLING TANK
(13' x 13' x 11'-6")
EFFLUENT

WEBB TRAILER COURT

Type of Treatment: Primary-Septic Tank
Population Served: 70

The Webb Trailer Court, containing about 30 units, is located one-half mile east of Morrison on the south side of U. S. Highway 285. About 6000 gpd of effluent from a septic tank is discharged to Bear Creek, RM 326.4-10.6. The existing treatment system should be abandoned and necessary arrangements made to connect to the Morrison sewer system when constructed.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml
12/12/66 1245	7.5	130	232	41	36	0.1	28.0×10^6	4.9×10^6

WEST JEFFERSON COUNTY SANITATION DISTRICT

Type of Treatment: Secondary-Extended Aeration
Population Served: Varies

The West Jefferson County Sanitation District sewage treatment plant (see diagram) is located one-half mile north of Evergreen Lake near the Hiwan Golf Club, RM 326.4-21.9-0.6. Treatment is provided by a Chicago Pump Company "Rapid Bloc" package plant. The treatment system serves the Hiwan Golf Club and about 20 homes. During the summer months the plant effluent is stored in reservoirs and used to irrigate the golf course.

WEST JEFFERSON SCHOOL

Type of Treatment: Secondary-Extended Aeration
Population Served: 500

The West Jefferson School (Jefferson County School District No. R-1) is an elementary and junior high school with a total enrollment of 500 students. The school is located near U. S. Highway 285 about one mile north of its junction with State Highway 73. Effluent from the extended aeration package plant is released to a ditch, RM 326.4-8.1-8.3L-7.6-0.5, that flows to a small reservoir at the headwaters of South Turkey Creek. The plant, maintained by school personnel, treats about 3000 gpd wastewater.

Effluent Data: West Jefferson School

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	Cl Res mg/l
12/12/66 1145	8.4	27	176	43	35	<0.1	2.0	<1.8	1.4

Larimer County

ASPENGLEN CAMPGROUND

Type of Treatment: Primary-Septic Tank and Sand Filter
Population Served: Varies

The Aspenglen Campground is located in Rocky Mountain National Park about one-fourth mile southwest of the Fall River Entrance. The sewage treatment plant (see diagram) is located behind the caretaker's living quarters. Effluent flows to Fall River, RM 260.4-59.7-5.0, a tributary of the Big Thompson River. The Campground contains 110 sites and is open year-around. During the summer tourist season the flow from the treatment system approximates 6500 gpd.

Effluent Data:

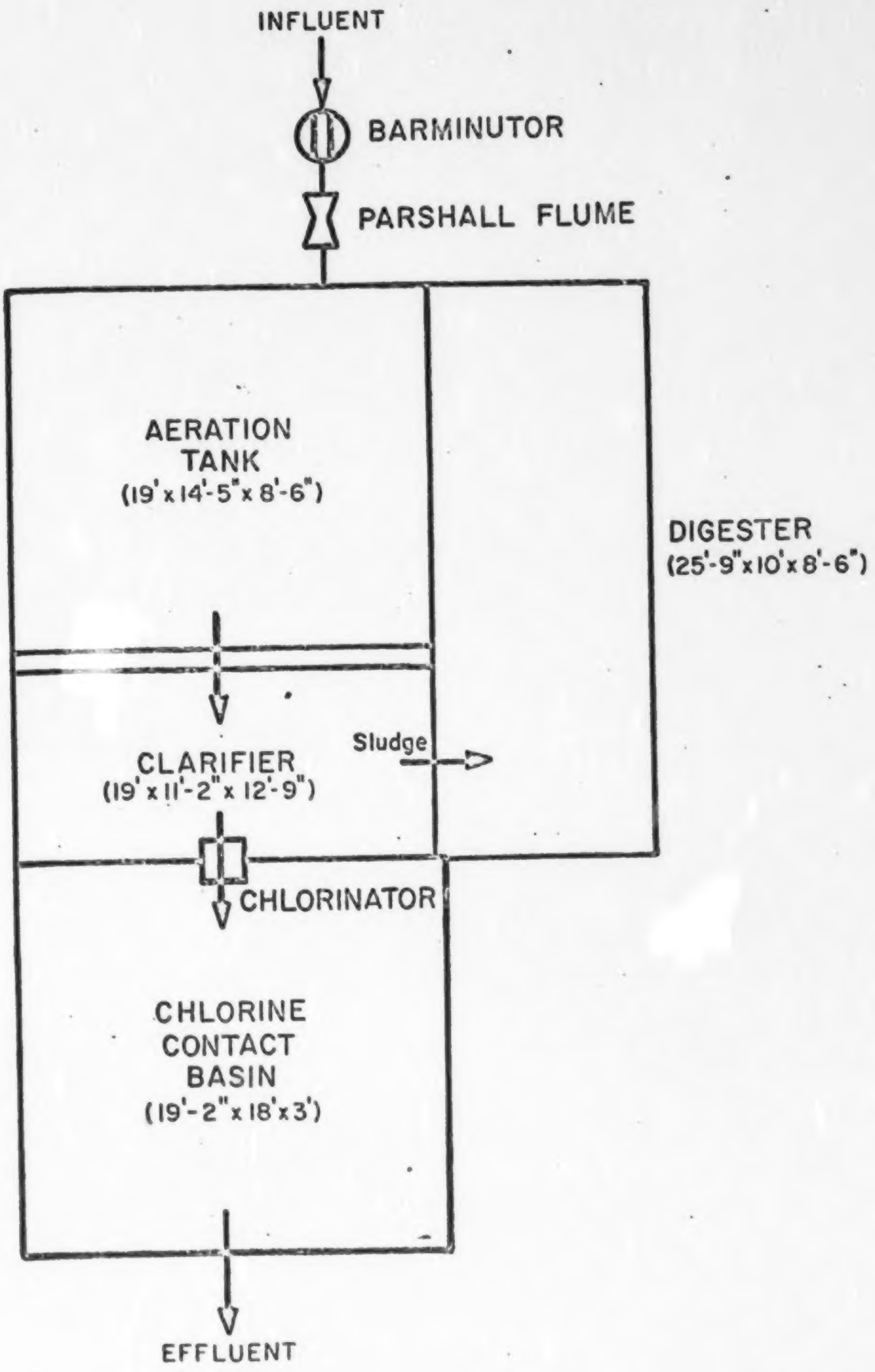
Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l	Cl Res mg/l
8/23/66 1120	7.0	104	244	26	10	0.1	<1.8	<1.8	0.5	1.6
8/24/66 1315	7.2	153	277	17	14	<0.1	<1.8	<1.8	--	--

BERTHOUD

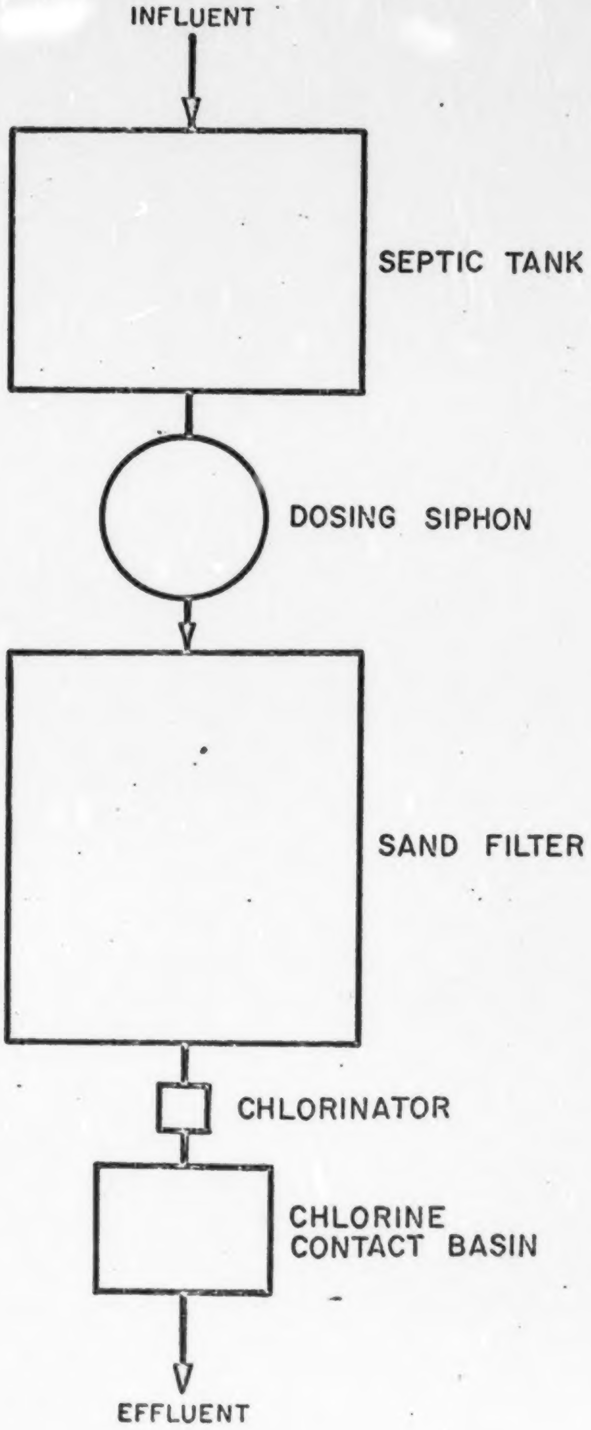
Type of Treatment: Secondary-Trickling Filter
Population Served: 1850

The Berthoud sewage treatment plant (see diagram) is located about one-half mile south of the southeast corner of the community. Effluent was discharged to a ditch, RM 260.4-7.0-18.6-0.6, flowing to the Little Thompson River. The plant was constructed in 1935 and expanded and modified in 1960 and 1965. Both the Town of Berthoud and the South Loveland Sanitation District are served by this treatment system. The average flow through the plant equals the design capacity of 0.35 MGD. Flows in excess of the plant's capacity are frequently incurred, particularly during the irrigation season, due to excessive infiltration in the sewer collection system. A fixed rate chlorinator is used to disinfect the effluent throughout the year.

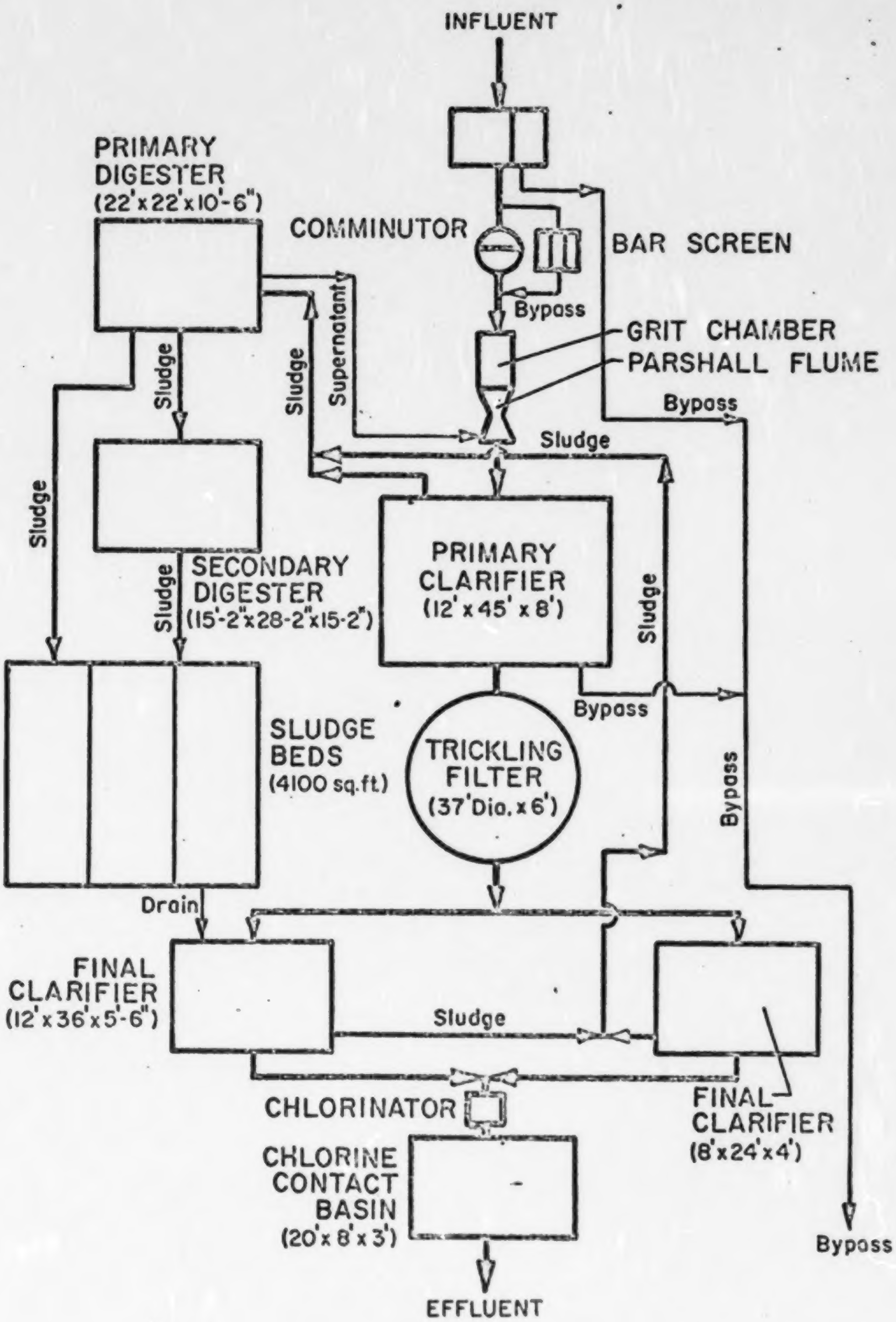
WEST JEFFERSON COUNTY SANITATION DISTRICT SEWAGE TREATMENT PLANT


INFLUENT
BARMINUTOR
PARSHALL FLUME
AERATION TANK
(19'x14'-5"x8'-6")
DIGESTER
(25'-9"x10'x8'-6")
Sludge
CLARIFIER
(19'x11'-2"x12'-9")
CHLORINATOR
CHLORINE CONTACT BASIN
(19'-2"x18'x3')
EFFLUENT

ASPENGLEN CAMPGROUND SEWAGE TREATMENT PLANT


INFLUENT
SEPTIC TANK
DOSING SIPHON
SAND FILTER
CHLORINATOR
CHLORINE CONTACT BASIN
EFFLUENT

BERTHOUD
SEWAGE TREATMENT PLANT


INFLUENT
PRIMARY DIGESTER (22'x22'x10'-6")
COMMINUTOR
BAR SCREEN
Bypass
GRIT CHAMBER
PARSHALL FLUME
Supernatant
Sludge
Sludge
Sludge
Bypass
Sludge
SECONDARY DIGESTER (15'-2"x28-2"x15-2")
Sludge
PRIMARY CLARIFIER (12' x 45' x 8')
Sludge
Bypass
Bypass
SLUDGE BEDS (4100 sq.ft.)
TRICKLING FILTER (37' Dia. x 6')
Drain
FINAL CLARIFIER (12'x36'x5'-6")
Sludge
CHLORINATOR
FINAL CLARIFIER (8'x24'x4')
CHLORINE CONTACT BASIN (20'x8'x3')
Bypass
EFFLUENT

SAMPLING DATA
BERTHOUD SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/l	COD mg/l	Cond umhos	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/l
EFFLUENT 1/													
5/10/66	1000	Grab	13	7.7	37	98	1470	43	33	0.1	2,800,000	1,100,000	--
5/10/66	1200	Grab	14	7.7	52	132	1350	39	33	<0.1	7,000,000	2,200,000	--
5/10/66	1400	Grab	15	7.7	48	108	1380	36	32	<0.1	4,600,000	1,700,000	--
5/11/66	0900	Grab	12	7.7	30	73	1360	27	26	0.1	1,700,000	1,100,000	--
5/11/66	1100	Grab	14	7.8	38	59	1350	30	28	0.1	3,300,000	1,700,000	--
5/11/66	1500	Grab	13	7.5	39	110	1260	35	33	0.1	1,300,000	33,000	--
5/12/66	0800	Grab	11	7.7	10	51	1290	16	13	<0.1	490,000	23,000	--
5/12/66	1030	Grab	12	7.6	24	77	1430	28	18	0.1	790,000	230,000	--
5/12/66	1300	Grab	12	7.6	26	94	1330	22	18	<0.1	1,700,000	700,000	--
5/10/66		Comp	--	7.7	38	100	1440	30	26	<0.1	--	--	2.4
5/11/66		Comp	--	7.7	29	88	1340	32	30	0.1	--	--	2.2
5/12/66		Comp	--	7.6	19	79	1350	21	17	<0.1	--	--	1.7
Average (Grabs)			13	7.7	34	89	1358	31	26	<0.1	1,700,000	1,100,000	
Average (Composites)				7.7	29	89	1377	28	25	<0.1			
INFLUENT													
5/10/66	1000	Grab	14	7.3	240	286	1440	168	124	4.0	--	--	--
5/10/66	1200	Grab	13	7.3	92	206	1320	112	80	2.5	--	--	--
5/10/66	1400	Grab	14	7.4	150	288	1320	106	82	2.0	--	--	--
5/11/66	0900	Grab	13	7.1	155	353	1310	118	110	3.0	--	--	--
5/11/66	1100	Grab	13	7.4	150	271	1260	94	92	5.0	--	--	--
5/11/66	1500	Grab	14	7.5	99	181	1210	66	66	5.0	--	--	--
5/12/66	0800	Grab	12	7.4	74	138	1500	64	51	3.0	--	--	--
5/12/66	1030	Grab	12	7.3	165	226	1280	100	86	5.0	--	--	--
5/12/66	1300	Grab	13	7.3	69	140	1170	64	58	3.0	--	--	--
5/10/66		Comp	--	7.5	125	212	1390	104	84	2.5	--	--	3.3
5/11/66		Comp	--	7.6	140	345	1270	106	98	5.0	--	--	3.7
5/12/66		Comp	--	7.5	99	213	1340	168	160	3.0	--	--	2.4
Average (Grabs)			13	7.3	133	232	1312	99	83	3.6			
Average (Composites)				7.5	121	256	1334	126	114	3.5			3.1
PERCENT REMOVALS (Composites)					76			78	78	>97			

1/ Treatment plant effluent only - Does not include bypassed sewage.

Two part-time operators devote 25 manhours per week in the operation and maintenance of the facility. A limited amount of laboratory equipment is available and used to determine effluent BOD once per week and chlorine residual about three times per week. Records of BOD analyses only are maintained.

About 3000 feet of sewers have recently been inspected and major leaks repaired. During the sampling period from 5/10-12/66, sewage was bypassed at times of peak flow. The sampling data reported in the attached table indicate plant effluent only and do not include the bypassed wastes. The treatment system was hydraulically overloaded and infiltration accounted for almost one-half of the total flow. The sewer inspection program should be expedited and corrective action taken as soon as possible. Bypassing of the facility during peak flow periods must be eliminated. Increased operational control and laboratory analyses are necessary to assure proper treatment.

BOXELDER SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Pond
Population Served: 250

The Boxelder Sanitation District sewage treatment facility is located one-half mile west of Interstate Highway 25 and one mile south of Prospect Street near Fort Collins. Effluent is discharged to Boxelder Creek near its confluence with the Cache la Poudre River, RM 249.0-38.7-0.2. The 2.4 acre treatment pond was constructed in 1965, and serves a housing development contributing 20,000 gpd of wastes. The lagoon was conceived as a temporary facility to be eventually connected to the new Fort Collins treatment plant now under construction.

Effluent Data:

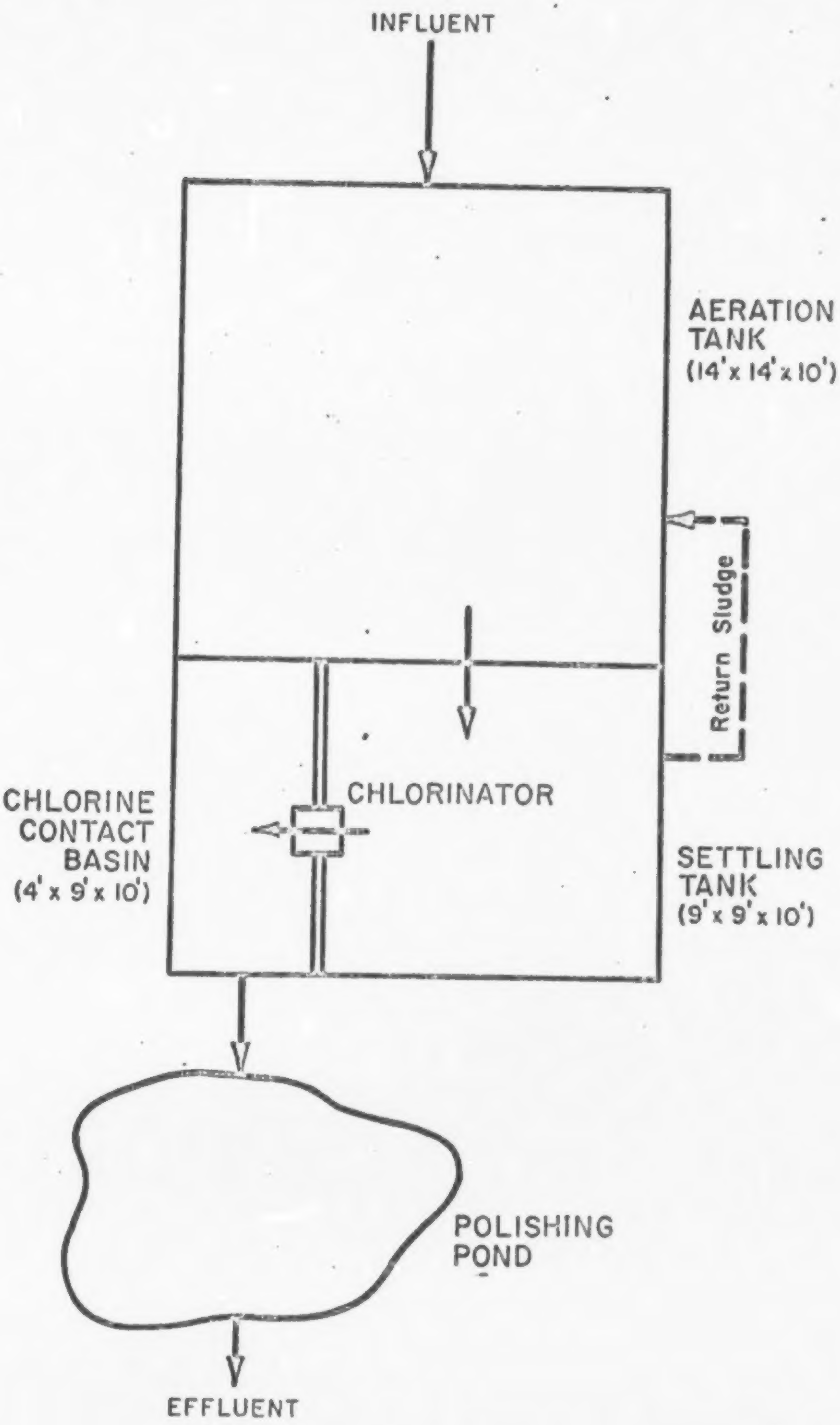
Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
6/15/66 0900	7.9	15	56	10	10	<0.1	79,000	33,000	2.0
6/20/66 1045	9.9	42	125	82	62	<0.1	1,300	49	0.8
7/20/66 1300	9.1	22	107	67	49	<0.1	220,000	33,000	0.8

EDEN VALLEY INSTITUTE

Type of Treatment: Secondary-Extended Aeration
Population Served: 70

The Eden Valley Institute, a nursing home, is located approximately 10-1/2 miles northwest of Loveland. Treatment is provided by an extended aeration package plant (see diagram), installed in 1963. Effluent is discharged to an intermittent stream, RM 260.4-34.1-3.1-0.9, flowing to Buckhorn Creek, a tributary of the Big Thompson River.

EDEN VALLEY INSTITUTE
SEWAGE TREATMENT PLANT


INFLUENT
AERATION TANK (14' x 14' x 10')
Return Sludge
CHLORINATOR
CHLORINE CONTACT BASIN (4' x 9' x 10')
SETTLING TANK (9' x 9' x 10')
POLISHING POND
EFFLUENT

ESTES PARK RECLAMATION SUBDIVISION SANITATION DISTRICT

Type of Treatment: Secondary-Trickling Filter
Population Served: 200

The Estes Park Reclamation Subdivision Sanitation District sewage treatment plant (see diagram) is located on the southwest side of Lake Estes, one hundred yards east of the power plant. The effluent is discharged to Lake Estes, RM 260.4-58.6, on the headwaters of the Big Thompson River. The plant was constructed in 1939 and treats an average flow of about 16,000 gpd. Present planning indicates this facility will be abandoned in 1970 and the wastes diverted to the Estes Park Sanitation District sewer collection system.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
7/14/66 1300	6.8	--	39	66	32	<0.1	33,000	11,000	1.4
7/19/66 1230	7.6	15	63	26	20	0.2	17,000	33,000	1.0
8/23/66 1000	7.2	22	64	22	18	0.5	49,000	79,000	1.0
8/24/66 0920	7.1	20	64	20	15	0.3	31,000	79,000	--

ESTES PARK SANITATION DISTRICT

Type of Treatment: Secondary-Activated Sludge
Population Served: 2,000 Winter
15,000 Summer

The Estes Park Sanitation District sewage treatment plant (see diagram), is located on the south side of U. S. Highway 34 about one-quarter mile east of the junction of U. S. Highway 34 and State Highway 66. Effluent is discharged to the Big Thompson River, RM 260.4-59.1, immediately above Lake Estes. The 1.5 MGD plant, constructed in 1965, was designed so that half of the major units may be taken out of operation during the non-tourist winter season. Average daily summer flow is 0.9 MGD with a daily peak of about 1.3 MGD. Wastes are predominantly domestic but, during the summer, 22 restaurants serving the tourist trade contribute a high grease load.

One man devotes 48 hours per week operating and maintaining the system. Twelve manhours are devoted to laboratory work and maintenance of records and reports. Laboratory analyses are performed twice weekly to determine settleable solids, temperature, pH, dissolved oxygen, BOD, total

SAMPLIN DATA
ESTES PARK SANITATION DISTRICT SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
3/08/66	1000	Grab	3	6.8	6.9	102	111	34	34	<0.1	2,200	460	--
3/08/66	1200	Grab	4	6.9	<4.5	74	112	44	44	<0.1	2,300	1,300	--
3/08/66	1400	Grab	3	6.9	<4.5	44	120	20	20	<0.1	4,600	3,300	--
3/09/66	1100	Grab	4	7.2	<4.5	40	134	18	14	<0.1	700	--	--
3/09/66	1300	Grab	3	7.2	<4.5	36	138	17	15	<0.1	3,300	2,300	--
3/09/66	1500	Grab	3	7.2	<4.5	34	138	14	12	<0.1	7,900	3,300	--
3/10/66	0800	Grab	-	6.8	<4.5	44	108	18	14	<0.1	22	7.8	--
3/10/66	1030	Grab	3	7.0	<4.5	46	123	19	16	<0.1	1,100	330	--
3/10/66	1300	Grab	3	7.1	<4.5	60	136	31	22	<0.1	13,000	1,700	--
3/08/66		Comp	-	6.9	<4.5	48	117	22	19	<0.1	--	--	--
3/09/66		Comp	-	7.3	<4.5	--	128	16	14	<0.1	--	--	0.6
3/10/66		Comp	-	7.3	<4.5	28	129	29	26	<0.1	--	--	0.8
Average (Grabs)			3	7.0	<4.8	53	125	24	21	<0.1	23,000	1,400	
Average (Composites)				7.2	<4.5	38	125	22	20	<0.1			0.7
INFLUENT													
3/08/66	1000	Grab	4	7.1	55	108	115	44	35	1.5	--	--	--
3/08/66	1200	Grab	5	7.2	65	110	166	31	31	1.0	--	--	--
3/08/66	1400	Grab	5	7.2	82	190	154	48	48	0.1	--	--	--
3/09/66	1100	Grab	5	7.4	76	164	161	40	34	1.0	--	--	--
3/09/66	1300	Grab	4	7.6	106	278	268	79	69	2.0	--	--	--
3/09/66	1500	Grab	5	7.5	35	82	131	22	21	0.5	--	--	--
3/10/66	0800	Grab	-	7.1	66	152	234	52	48	4.0	--	--	--
3/10/66	1030	Grab	3	7.5	63	144	147	58	46	3.0	1,300,000	330,000	--
3/10/66	1330	Grab	4	7.4	60	136	178	44	32	2.0	1,400,000	490,000	--
3/08/66		Comp	-	7.2	79	160	166	36	36	<0.1	--	--	--
3/09/66		Comp	-	7.5	78	162	204	66	59	0.5	--	--	1.8
3/10/66		Comp	-	7.4	55	134	165	43	34	1.0	--	--	1.3
Average (Grabs)			4	7.3	67	152	173	46	40	1.7	1,400,000	410,000	
Average (Composites)				7.4	71	152	178	48	43	<0.5			1.6
PERCENT REMOVALS (Composites)					>92			54	53	>80			

SAMPLING DATA (continued)
ESTES PARK SANITATION DISTRICT SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/l	COD mg/l	Cond µmhos	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/l
EFFLUENT													
8/23/66	0800	Grab	16	6.9	--	115	280	20	20	0.5	2,300	13	--
8/23/66	1100	Grab	20	7.1	--	142	319	63	56	2.0	2,300	95	--
8/23/66	1300	Grab	20	7.1	--	213	340	83	73	4.0	17,000	33	--
8/24/66	1200	Grab	20	7.2	30	234	324	117	91	5.0	1,300,000	7,900	--
8/24/66	1400	Grab	20	7.2	15	115	319	117	91	5.0	3,500,000	3,300	--
8/24/66	1500	Grab	20	7.2	12	109	324	53	44	0.7	790,000	1,500	--
8/25/66	0900	Grab	18	7.2	6.5	90	287	38	32	<0.1	1,700	4.5	--
8/25/66	1000	Grab	20	7.2	9.5	92	303	46	41	0.3	23,000	33	--
8/25/66	1100	Grab	20	7.1	22	131	321	82	68	1.0	220,000	170	--
8/23/66		Comp	--	7.2	--	168	309	63	55	2.5	--	--	0.8
8/24/66		Comp	--	7.3	20	174	300	65	53	2.5	--	--	1.0
8/25/66		Comp	--	7.3	44	121	303	74	65	0.7	--	--	0.8
Average (Grabs)			19	7.1	16	138	313	69	57	<2.1	23,000	95	
Average (Composites)				7.3	32	154	304	67	58	1.9			0.9
INFLUENT													
8/23/66	0800	Grab	18	7.2	--	857	464	217	205	15	170,000,000	7,000,000	--
8/23/66	1100	Grab	21	7.2	--	601	364	189	176	6.5	230,000,000	23,000,000	--
8/23/66	1300	Grab	20	7.2	--	600	371	127	118	6.5	23,000,000	2,300,000	--
8/24/66	1200	Grab	20	7.0	200	439	365	125	109	6.0	28,000,000	4,900,000	--
8/24/66	1400	Grab	20	7.0	170	279	300	129	123	8.5	17,000,000	4,900,000	--
8/24/66	1500	Grab	20	7.1	275	686	335	162	142	9.0	33,000,000	3,300,000	--
8/25/66	0900	Grab	15	7.2	225	633	482	181	163	9.0	130,000,000	49,000,000	--
8/25/66	1000	Grab	20	7.3	230	531	393	174	143	9.0	110,000,000	22,000,000	--
8/25/66	1100	Grab	20	7.4	200	383	331	133	113	5.5	110,000,000	28,000,000	--
8/23/66		Comp	--	7.1	--	566	408	151	130	5.0	--	--	3.6
8/24/66		Comp	--	7.1	250	701	371	185	160	8.0	--	--	4.3
8/25/66		Comp	--	7.5	100	484	379	161	147	6.0	--	--	4.1
Average (Grabs)			19	7.2	217	557	378	160	144	8.3	110,000,000	7,000,000	
Average (Composites)				7.2	175	584	386	166	146	6.3			4.0
PERCENT REMOVALS (Composites)					82			60	60	70			

solids, and suspended solids. Chlorine residual and sludge settling are determined daily. Tests are performed on the influent and effluent and intermediate points. Operating records are maintained for flow, sludge removal, stream conditions, and weather. Operational difficulties, caused mainly by equipment failures, have a serious adverse effect on the performance of the treatment works.

FALL RIVER PASS LODGE

Type of Treatment: Secondary-Waste Stabilization Pond
Population Served: Varies

The Fall River Pass Lodge (Alpine Visitor Center) is located about 22 miles west of Estes Park adjacent to U. S. Highway 34 at the summit of Fall River Pass in the Rocky Mountain National Park. The Lodge, open only during the summer months, contains a curio shop, snack bar, information center, and sanitary facilities which are served by a non-overflowing lagoon constructed in 1964.

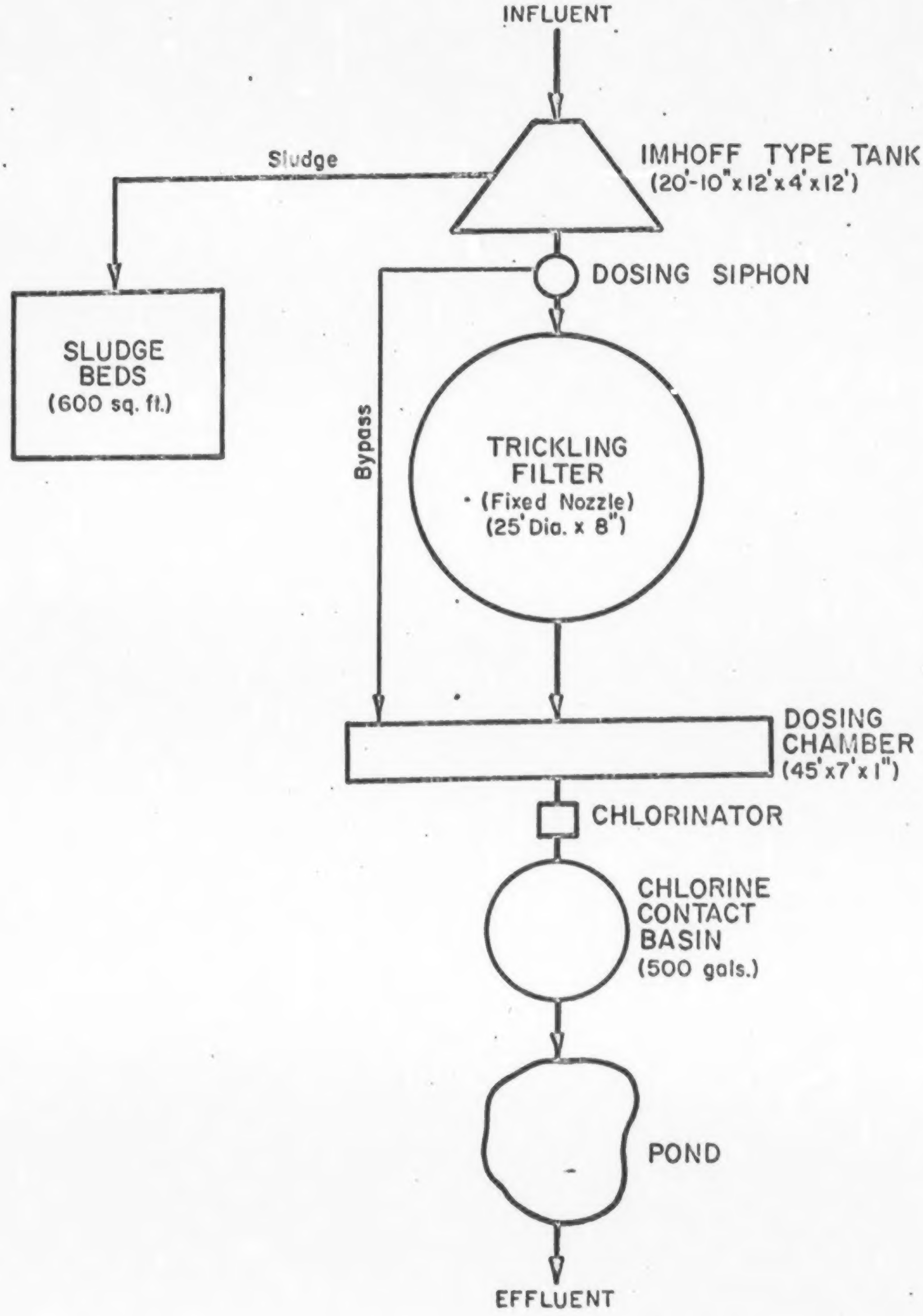
FORT COLLINS

Type of Treatment: Secondary-Trickling Filter
Population Served: 31,000

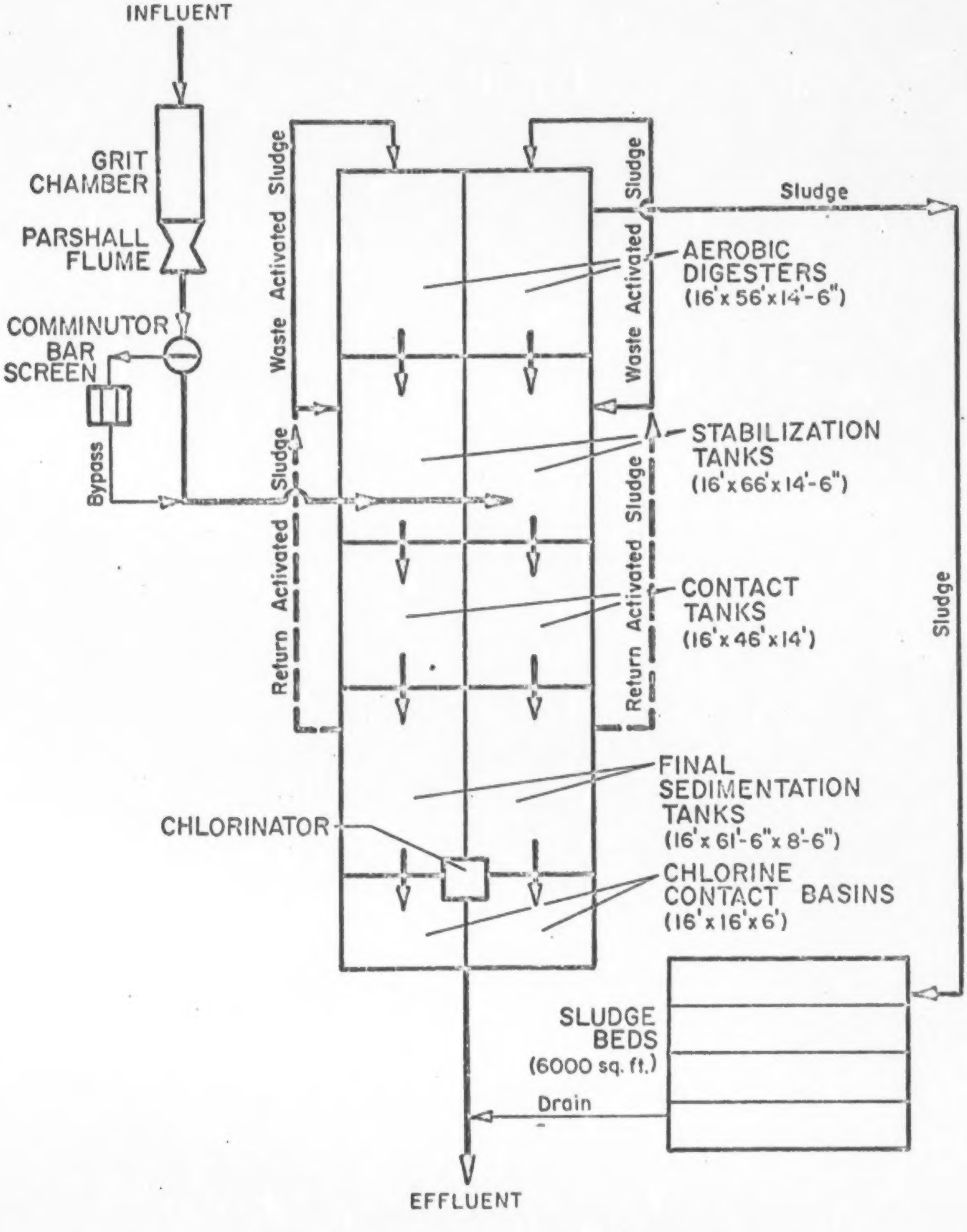
The Fort Collins sewage treatment plant (see diagram) is located near Riverside Drive and Mulberry Street and discharges effluent to the Cache la Poudre River, RM 249.0-44.1. The plant, constructed in 1948, was expanded in 1958 and again in 1961. The capacity is 6.0 MGD with an average flow of 5.5 MGD, but peak flow rates have been estimated as high as 12 MGD. There are no facilities for disinfection of plant effluent. Personnel assigned to the facility consist of one operator for 48 hours per week and one laborer for 40 hours per week. No laboratory work is performed by plant personnel, but Colorado State University provides laboratory services on a contractual basis with the city. Grab samples are collected and analyzed bi-weekly for BOD, suspended solids, settleable solids, pH, dissolved oxygen, and coliform. Operating records are maintained daily for flow, gas production, and weather conditions.

A 15 MGD activated sludge plant (see diagram) is under construction near Drake Road, about two miles southeast of Fort Collins. A portion of the flow to the existing treatment plant will be diverted to the new plant when completed in November 1967. Alterations reportedly will be made to the existing treatment plant.

ESTES PARK RECLAMATION SUBDIVISION SANITATION DISTRICT SEWAGE TREATMENT PLANT


INFLUENT
Sludge
IMHOFF TYPE TANK
(20'-10"x12'x4'x12')
DOSING SIPHON
SLUDGE BEDS
(600 sq. ft.)
Bypass
TRICKLING FILTER
(Fixed Nozzle)
(25' Dia. x 8")
DOSING CHAMBER
(45'x7'x1")
CHLORINATOR
CHLORINE CONTACT BASIN
(500 gals.)
POND
EFFLUENT

ESTES PARK SANITATION DISTRICT SEWAGE TREATMENT PLANT


INFLUENT
GRIT CHAMBER
PARSHALL FLUME
COMMINUTOR
BAR SCREEN
Bypass
Waste Activated Sludge
Waste Activated Sludge
Sludge
AEROBIC DIGESTERS (16' x 56' x 14'-6")
STABILIZATION TANKS (16' x 66' x 14'-6")
Return Activated Sludge
Return Activated Sludge
CONTACT TANKS (16' x 46' x 14')
FINAL SEDIMENTATION TANKS (16' x 61'-6" x 8'-6")
CHLORINATOR
CHLORINE CONTACT BASINS (16' x 16' x 6')
Sludge
SLUDGE BEDS (6000 sq. ft.)
Drain
EFFLUENT

SAMPLING DATA
FORT COLLINS SEWAGE TREATMENT PLANT

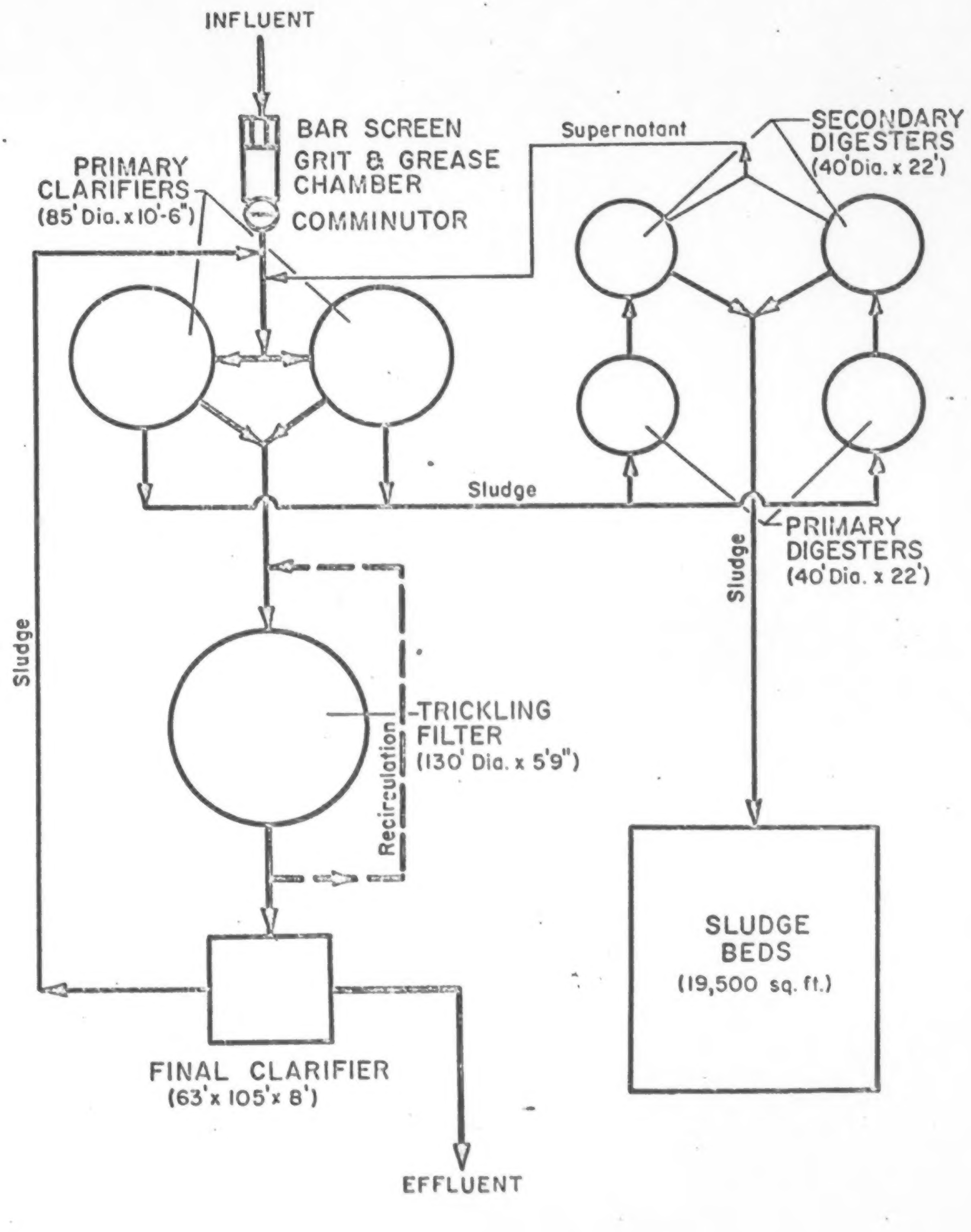
Date	Time	Sample Type	Temp °C	pH	BOD mg/1	Cond μmhos	TSS mg/1	VSS mg/1	Settl.Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT												
8/10/65	0810	Grab	18	7.6	31	715	31	25	0.1	4,900,000	3,300,000	--
8/10/65	1000	Grab	18	7.6	33	701	27	27	< 0.1	7,000,000	3,300,000	--
8/10/65	1300	Grab	20	7.7	41	685	32	32	< 0.1	7,000,000	3,300,000	--
8/10/65	1540	Grab	20	7.7	72	683	26	20	< 0.1	7,900,000	1,300,000	--
8/11/65	0800	Grab	18	7.6	43	652	28	28	< 0.1	7,900,000	1,100,000	--
8/11/65	1000	Grab	18	7.8	--	670	25	25	0.1	4,900,000	1,300,000	--
8/11/65	1200	Grab	20	7.8	74	666	29	28	0.1	4,600,000	1,700,000	--
8/11/65	1400	Grab	20	7.8	80	652	41	41	0.1	4,900,000	2,300,000	--
8/12/65	0905	Grab	19	7.6	23	654	19	19	< 0.1	17,000,000	1,700,000	--
8/12/65	1120	Grab	20	7.8	32	680	33	22	< 0.1	4,900,000	4,900,000	--
8/12/65	1305	Grab	20	7.7	45	679	38	29	< 0.1	4,900,000	1,700,000	--
8/12/65	1500	Grab	20	7.8	36	643	32	26	< 0.1	7,900,000	700,000	--
8/10/65		Comp	--	7.7	33	688	33	33	< 0.1	--	--	--
8/11/65		Comp	--	7.8	--	657	--	--	< 0.1	--	--	--
8/12/65		Comp	--	7.8	38	621	23	21	0.2	--	--	1.5
Average (Grabs)			19	7.7	43	673	30	27	< 0.1	5,900,000	1,700,000	
Average (Composites)				7.8	36	656	28	27	< 0.1			1.5
INFLUENT												
8/10/65	0802	Grab	17	7.4	91	701	55	33	3.0	--	--	--
8/10/65	1010	Grab	18	7.6	250	674	135	123	11.	--	--	--
8/10/65	1310	Grab	20	7.4	180	661	119	100	4.5	--	--	--
8/10/65	1545	Grab	20	7.8	225	594	145	112	3.5	--	--	--
8/11/65	0810	Grab	17	7.7	95	670	69	69	2.5	--	--	--
8/11/65	1000	Grab	18	7.6	250	670	153	137	5.5	--	--	--
8/11/65	1200	Grab	20	7.6	215	645	310	172	5.0	--	--	--
8/11/65	1400	Grab	20	7.5	175	629	45	45	3.5	--	--	--
8/12/65	0900	Grab	19	7.2	150	703	128	98	4.4	--	--	--
8/12/65	1115	Grab	19	7.7	160	670	136	113	5.5	--	--	--
8/12/55	1300	Grab	20	7.6	150	648	92	72	3.5	--	--	--
8/12/65	1455	Grab	20	7.6	155	620	102	84	3.2	--	--	--
8/10/65		Comp	--	7.6	180	674	97	90	3.5	--	--	--
8/11/65		Comp	--	7.6	185	678	131	110	2.0	--	--	--
8/12/65		Comp	--	7.7	120	647	87	69	2.3	--	--	2.3
Average (Grabs)			19	7.6	175	657	124	97	4.6			
Average (Composites)				7.6	162	667	105	90	2.6			2.3
PERCENT REMOVALS (Composites)					77		73	70	>96			

SAMPLING DATA (continued)

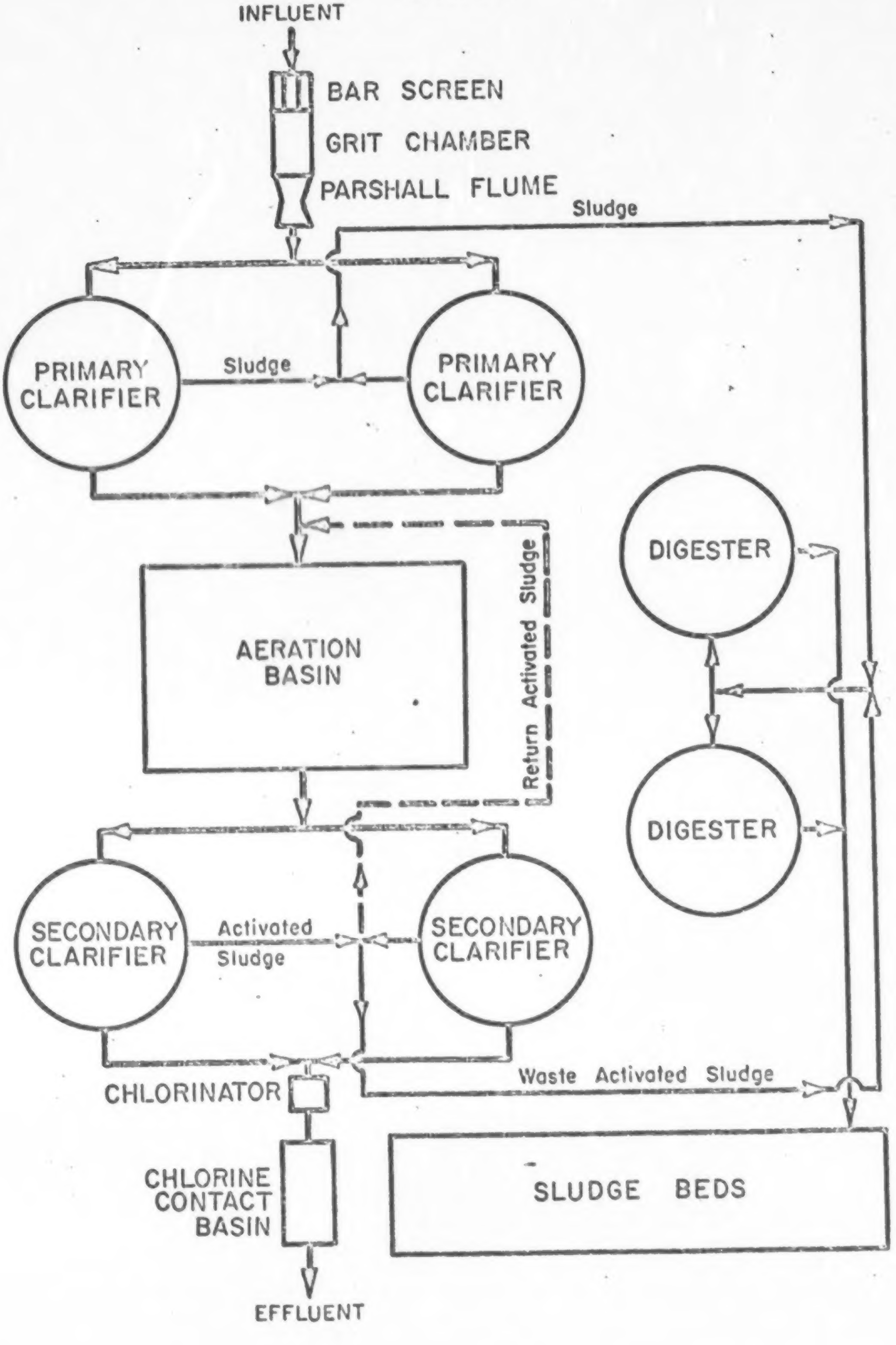
FORT COLLINS SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/l	COD mg/l	Cond umhos	TSS mg/l	VSS mg/l	Settl.Sol. ml/l	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/l
EFFLUENT													
4/20/66	1000	Grab	11	7.4	48	119	685	44	36	<0.1	7,900,000	3,300,000	--
4/20/66	1300	Grab	13	7.7	95	173	900	61	49	<0.1	22,000,000	3,300,000	--
4/20/66	1500	Grab	14	7.7	98	187	840	59	46	0.2	7,000,000	2,300,000	--
4/21/66	0900	Grab	12	7.3	50	119	720	34	33	<0.1	7,900,000	790,000	--
4/21/66	1200	Grab	13	7.3	80	146	855	54	46	<0.1	7,000,000	1,700,000	--
4/21/66	1400	Grab	15	7.3	88	164	830	61	53	0.2	7,900,000	3,300,000	--
4/20/66		Comp	--	7.7	110	158	755	59	45	<0.1	--	--	2.4
4/21/66		Comp	--	7.0	70	144	800	53	47	0.1	--	--	3.0
Average (Grabs)			13	7.5	77	151	805	52	44	<0.1	7,900,000	2,800,000	
Average (Composites)				7.4	90	151	778	56	46	<0.1			2.7
INFLUENT													
4/20/66	1000	Grab	13	7.4	380	515	740	889	843	8.5	--	--	--
4/20/66	1300	Grab	14	7.3	235	390	620	172	140	6.5	--	--	--
4/20/66	1500	Grab	14	7.1	295	535	1010	174	141	7.5	--	--	--
4/21/66	0900	Grab	13	7.6	290	450	835	1326	1252	8.5	--	--	--
4/21/66	1200	Grab	15	7.3	340	650	710	362	314	10.0	--	--	--
4/21/66	1400	Grab	14	7.2	305	540	700	174	156	7.5	--	--	3.5
4/20/66		Comp	--	7.5	240	665	755	248	218	5.5	--	--	4.8
4/21/66		Comp	--	7.3	280	415	705	190	166	7.0	--	--	
Average (Grabs)			14	7.3	308	513	769	516	474	8.1			4.2
Average (Composites)				7.4	260	540	730	219	192	6.3			
PERCENT REMOVALS (Composites)					65			74	76	>99			

FORT COLLINS
SEWAGE TREATMENT PLANT
(OLD)


INFLUENT
BAR SCREEN
GRIT & GREASE CHAMBER
COMMINUTOR
PRIMARY CLARIFIERS
(85' Dia. x 10'-6")
Supernatant
SECONDARY DIGESTERS
(40' Dia. x 22')
Sludge
PRIMARY DIGESTERS
(40' Dia. x 22')
Sludge
Sludge
TRICKLING FILTER
(130' Dia. x 5'9")
Recirculation
SLUDGE BEDS
(19,500 sq. ft.)
FINAL CLARIFIER
(63' x 105' x 8')
EFFLUENT

FORT COLLINS
SEWAGE TREATMENT PLANT
(NEW)


INFLUENT
BAR SCREEN
GRIT CHAMBER
PARSHALL FLUME
Sludge
PRIMARY CLARIFIER
Sludge
PRIMARY CLARIFIER
DIGESTER
AERATION BASIN
Return Activated Sludge
DIGESTER
SECONDARY CLARIFIER
Activated Sludge
SECONDARY CLARIFIER
CHLORINATOR
Waste Activated Sludge
CHLORINE CONTACT BASIN
SLUDGE BEDS
EFFLUENT

HIDDEN VALLEY SKI AREA

Type of Treatment: Primary-Septic Tanks and Sand Filters
Population Served: Varies

The Hidden Valley Ski Area is located on the west side of U. S. Highway 34 in the Rocky Mountain National Park about three and one-half miles west of the Fall River Entrance. Effluent from the system (see diagram) flows into Hidden Valley Creek, RM 260.4-59.7-6.4-3.1, a tributary of Fall River. The treatment plant serves the restaurant and sanitary facilities which are open year-round and wastes from camping trailers during the summer months.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l	Cl Res mg/l
7/13/66 1235	7.0	--	62	18	9	<0.1	4.5	<1.8	0.7	--
7/14/66 1345	6.7	--	42	8	7	<0.1	11.0	<1.8	0.4	3.0
8/23/66 1140	7.1	34	92	14	6	<0.1	<1.8	<1.8	0.4	--
8/24/66 1330	7.2	50	84	9	6	<0.1	2.0	<1.8	--	--

JOHNSON'S CORNER CAFE AND MOTEL

Type of Treatment: Secondary-Septic Tank and Waste Stabilization Pond
Population Served: Varies

Johnson's Corner Cafe and Motel are located adjacent to U. S. Highway 87 about five miles southeast of Loveland. The sewage treatment facilities are located approximately 3/4 mile north of the cafe and motel complex. The effluent flows to an intermittent stream, RM 260.4-22.2-3.6-1.4, then enters Hillsboro Ditch, an irrigation canal. The treatment system consists of two septic tanks and a half-acre lagoon followed by a small pond. The waste originates from the sanitary and kitchen facilities of the cafe and motel. On June 13, 1966, no discharge from the pond was evident.

LA PORTE SCHOOL

Type of Treatment: Secondary-Extended Aeration
Population Served: 780

The La Porte School (Cache la Poudre School Complex) sewage treatment plant is located two blocks west and one-half block south of LaPorte, near the Cache la Poudre River, RM 249.0-50.0. Treatment facilities (see diagram) consist of an extended aeration package plant followed by a polishing pond. No discharge to the river was observed.

LONG'S PEAK CAMPGROUND

Type of Treatment: Secondary-Septic Tank and Lagoon
Population Served: Varies

The Long's Peak Campground is located in the Rocky Mountain National Park about 7 miles south of Estes Park, and one mile west of State Highway 7. When discharge occurs, the effluent is released to Alpine Brook, RM 270.0-34.5R-17.7-3.7-3.0-1.1, a tributary of Tahosa Creek at the headwaters of St. Vrain Creek. Treatment is provided by a septic tank and a 0.3 acre lagoon constructed in early 1963. The campground contains 35 sites and is open during the period June 1 to September 15. The pond was not overflowing when visited.

LOVELAND

Type of Treatment: Secondary-Trickling Filter
Population Served: 13,500

The Loveland sewage treatment plant (see diagram) is located about three-quarters of a mile southeast of the city and discharges effluent to the Big Thompson River, RM 260.4-24.5. The high rate trickling filter plant, completed in 1962, has a design capacity of 3.0 MGD. The average daily flow was 1.8 MGD or approximately 130 gallons per capita per day. Although chlorination facilities were available, adequate disinfection of effluent is not practiced on a routine basis. In addition to the normal load on the treatment system, an average of 12 scavenger trucks per week deposit their load of septic tank wastes onto the system.

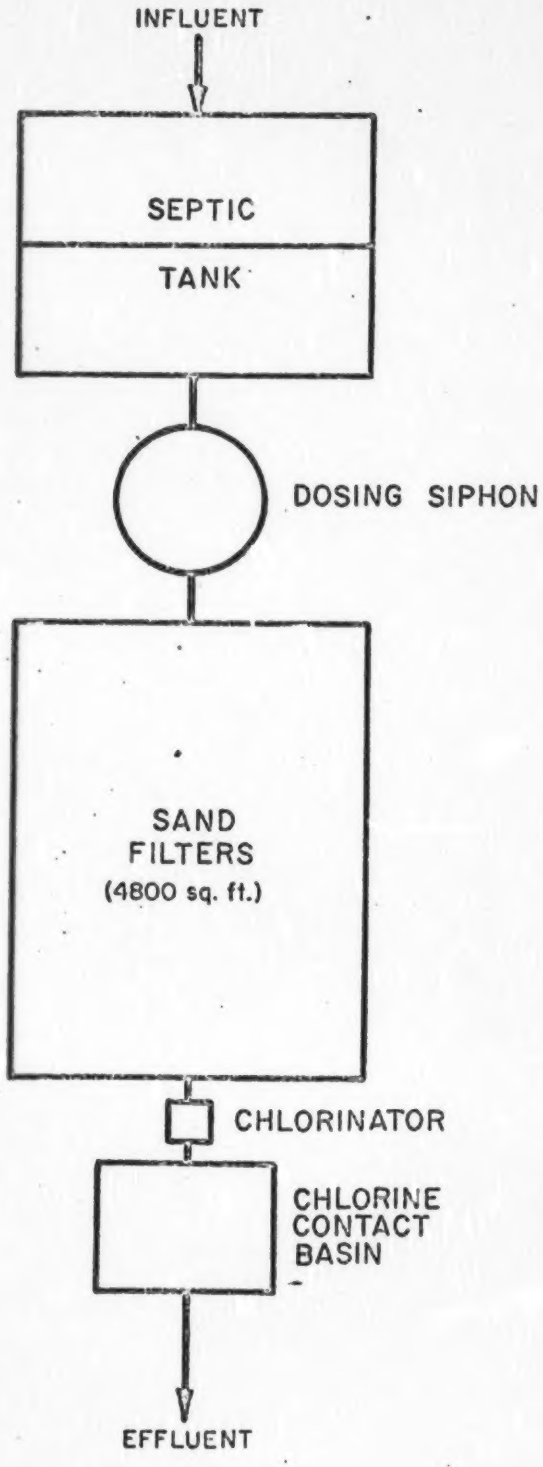
Two full-time operators are assigned eight hours per day, five days per week, to operate and maintain the treatment works. Laboratory analyses are performed weekly, including pH, suspended solids, and BOD. Coliform densities are run once a month. About six hours per week are devoted to laboratory work, including maintenance of records and reports.

NATIONAL PARK VILLAGE

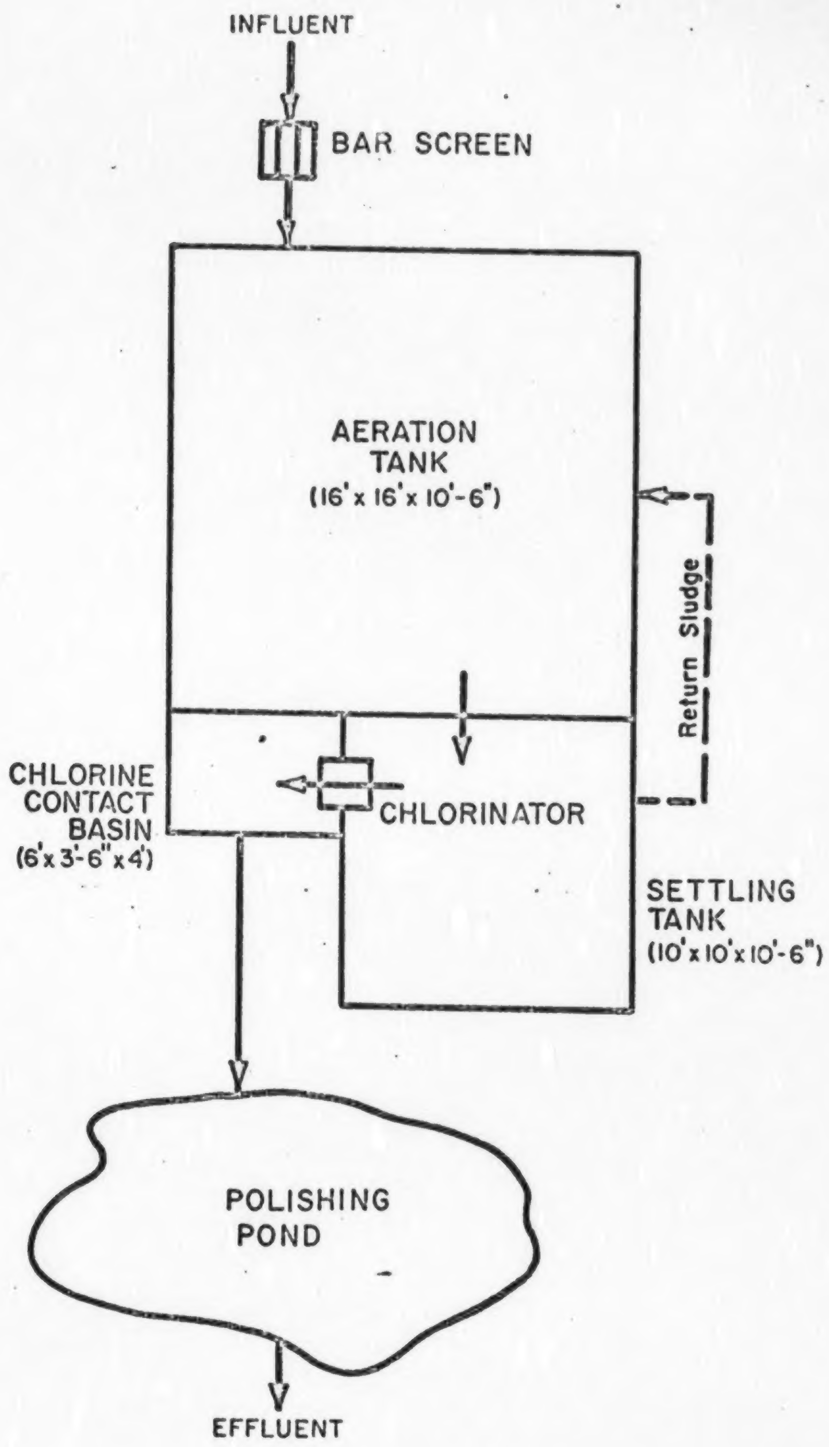
Type of Treatment: Secondary-Extended Aeration
Population Served: 300

The National Park Village is located approximately three miles northwest of Estes Park on the south side of U. S. Highway 34. Effluent from the treatment plant (see diagram) enters Fall River, RM 260.4-59.7-4.8, a tributary of the Big Thompson River. The extended aeration package plant was installed in 1964 with a capacity of 14,000 gpd. Approximately 70 employees reside at the village during the summer months. Waste load is contributed by these employees, a restaurant that serves about 1000 meals per day, and laundry facilities. The average flow was about 10,000 gpd.

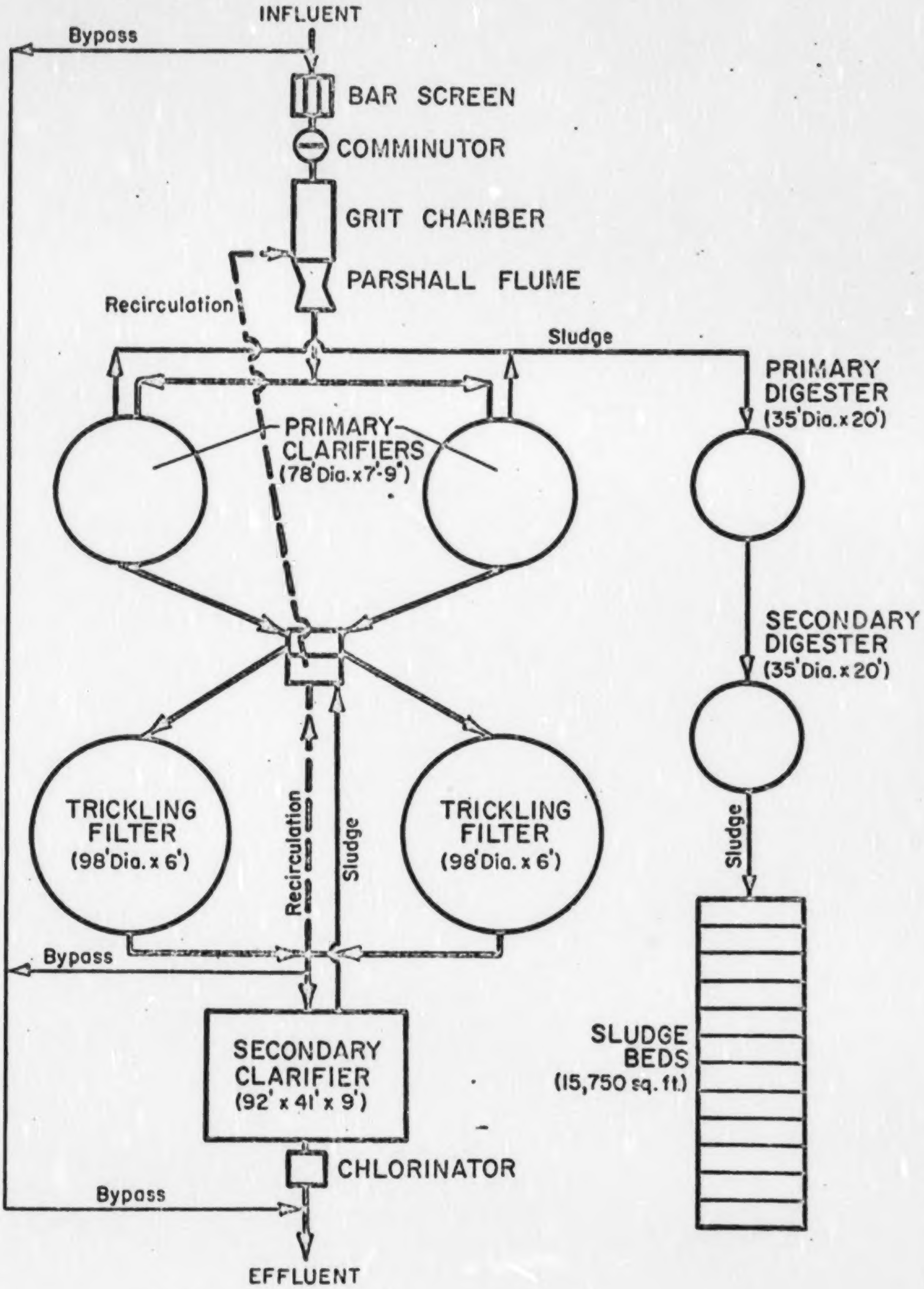
HIDDEN VALLEY SKI AREA SEWAGE TREATMENT PLANT


INFLUENT
SEPTIC
TANK
DOSING SIPHON
SAND
FILTERS
(4800 sq. ft.)
CHLORINATOR
CHLORINE
CONTACT
BASIN
EFFLUENT

LAPORTE SCHOOL
SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
AERATION
TANK
(16'x 16'x 10'-6")
Return Sludge
CHLORINE
CONTACT
BASIN
(6'x 3'-6"x 4')
CHLORINATOR
SETTLING
TANK
(10'x 10'x 10'-6")
POLISHING
POND
EFFLUENT

LOVELAND SEWAGE TREATMENT PLANT


INFLUENT
Bypass
BAR SCREEN
COMMINUTOR
GRIT CHAMBER
PARSHALL FLUME
Recirculation
Sludge
PRIMARY DIGESTER (35'Dia.x20')
PRIMARY CLARIFIERS (78'Dia.x7'-9')
SECONDARY DIGESTER (35'Dia.x20')
TRICKLING FILTER (98'Dia.x6')
Recirculation
Sludge
TRICKLING FILTER (98'Dia.x6')
Sludge
Bypass
SECONDARY CLARIFIER (92'x41'x9')
SLUDGE BEDS (15,750 sq. ft.)
CHLORINATOR
Bypass
EFFLUENT

SAMPLING DATA
LOVELAND SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
3/01/66	0900	Grab	8	7.6	55	141	885	77	50	0.4	7,900,000	1,700,000	--
3/01/66	1100	Grab	8	7.6	52	127	915	82	62	0.1	7,900,000	490,000	--
3/01/66	1400	Grab	9	7.6	58	152	955	85	57	<0.1	7,900,000	2,300,000	--
3/02/66	1000	Grab	7	7.7	49	108	1130	55	33	<0.1	4,900,000	1,100,000	--
3/02/66	1230	Grab	8	7.8	59	158	1110	52	39	<0.1	13,000,000	1,800,000	--
3/02/66	1500	Grab	8	7.8	56	143	1060	51	44	<0.1	4,600,000	4,600,000	--
3/03/66	1030	Grab	6	7.8	45	108	1080	45	34	<0.1	3,300,000	1,300,000	--
3/03/66	1230	Grab	6	7.8	50	110	1100	46	37	<0.1	4,900,000	4,900,000	--
3/03/66	1430	Grab	6	7.8	54	139	1080	55	43	<0.1	4,900,000	4,900,000	--
3/01/66		Comp	-	7.6	53	145	955	77	46	0.1	--	--	2.2
3/02/66		Comp	-	7.8	50	114	1110	38	36	<0.1	--	--	1.8
3/03/66		Comp	-	7.9	49	110	1100	42	35	<0.1	--	--	1.6
Average (Grabs)			7	7.5	53	132	1035	61	44	<0.1	7,900,000	1,800,000	
Average (Composites)				7.7	51	123	1055	52	39	<0.1			1.9
INFLUENT													
3/01/66	0900	Grab	10	7.7	212	386	900	214	172	9.2	--	--	--
3/01/66	1100	Grab	10	7.0	335	730	1200	369	277	17.0	--	--	--
3/01/66	1400	Grab	11	7.6	302	480	795	242	176	6.0	--	--	--
3/02/66	1000	Grab	10	7.9	320	515	900	360	274	11.0	--	--	--
3/02/66	1230	Grab	11	7.8	230	402	885	250	180	11.0	--	--	--
3/02/66	1500	Grab	10	7.6	220	417	920	250	177	5.3	--	--	--
3/03/66	1030	Grab	10	7.8	255	692	925	472	418	13.0	--	--	--
3/03/66	1230	Grab	10	7.6	315	420	940	259	221	18.0	--	--	--
3/03/66	1430	Grab	10	7.6	250	442	810	215	185	10.0	--	--	--
3/01/66		Comp	--	7.5	228	486	915	270	204	8.0	--	--	4.0
3/02/66		Comp	--	7.7	225	494	985	149	123	5.3	--	--	3.3
3/03/66		Comp	--	7.7	190	402	1000	168	148	5.5	--	--	3.2
Average (Grabs)			10	7.6	271	498	920	292	231	11.2			
Average (Composites)				7.6	214	461	967	196	158	6.3			3.5
PERCENT REMOVALS (Composites)					76			73	75	>99			

SAMPLING DATA (continued)
LOVELAND SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml
EFFLUENT												
1/04/67	1045	Grab	9	8.2	30	88	933	24	22	<0.1	3,300,000	790,000
1/18/67	1130	Grab	7	7.6	43	125	1030	33	26	<0.1	13,000,000	1,700,000
1/18/67	1300	Grab	6	7.6	44	131	1030	36	29	0.1	11,000,000	4,600,000
1/19/67	0900	Grab	6	7.8	41	94	1050	24	19	<0.1	3,300,000	1,100,000
1/19/67	1000	Grab	6	7.9	32	94	1050	24	17	<0.1	3,300,000	1,300,000
1/20/67	1030	Grab	8	8.0	37	86	981	23	19	0.1	11,000,000	4,600,000
1/20/67	1200	Grab	9	8.0	37	93	1030	29	22	<0.1	7,000,000	2,300,000
Average			8	7.9	38	102	1015	28	21	<0.1	7,400,000	1,300,000
INFLUENT												
1/18/67	1130	Grab	10	7.3	195	410	937	229	185	6.0	--	--
1/18/67	1300	Grab	9	7.2	235	391	937	215	175	7.0	--	--
Average			10	7.3	215	400	937	222	180	6.5	--	--
PERCENT REMOVALS					83			87	88	>98		

Effluent Data: National Park Village

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
7/13/66 1145	7.1	23	179	26	25	<0.1	1.7×10^{6}	6,800	1.8
7/14/66 1200	7.5	15	96	26	26	<0.1	1.7×10^{6}	17,000	1.5
8/23/66 1000	7.6	14	115	34	32	<0.1	1.3×10^{6}	13,000	1.2
8/24/66 1250	8.0	18	107	17	17	<0.1	230,000	13,000	--

NORTH COLLEGE AVENUE SANITATION DISTRICT

Type of Treatment: Secondary-Trickling Filter
Population Served: 2400

The North College Avenue Sanitation District sewage treatment plant (see diagram) is located within Fort Collins on the northeast side of the Cache la Poudre River one-quarter mile east of North College Avenue. The plant effluent is released to the Cache la Poudre River, RM 249.0-45.5. The facility was completed in 1959 and incorporates a Dorr-Oliver "Duo-Clarigester" in which the clarifier basin is divided to provide primary and secondary settling. Present flow is probably in excess of plant capacity of 180,000 gpd. Flow-measuring devices, chlorination, and laboratory facilities are not available. One man devotes two hours per day in operation and maintenance of the treatment system.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml
1/4/67 1215	8.1	132	262	91	83	0.1	23.0×10^{6}	1.7×10^{6}

SOUTH FORT COLLINS SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 450

The South Fort Collins Sanitation District sewage lagoons are located about one mile east of U. S. Highway 287 and one-quarter mile south of Portner Reservoir. The treatment system discharges to an intermittent stream, RM 249.0-30.9-7.5-0.4, that flows to Fossil Creek and then the Cache la Poudre River. The two ponds have a total surface area of five acres and receive an average flow of 70,000 gpd from a housing development.

Effluent Data: South Fort Collins Sanitation District

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml
1/4/67 1315	8.5	15	52	24	19	0.1	7,900	1,300

THUNDER MOUNTAIN LODGE

Type of Treatment: Secondary-Extended Aeration
Population Served: 95

The Thunder Mountain Lodge is located on the north side of U. S. Highway 34 near the National Park Village and the effluent enters a ditch, RM 260.4-59.7-4.7-0.2, flowing into Fall River. The extended aeration package plant (see diagram) was placed in operation in 1964 with a capacity of 7,000 gpd. During the summer months, the flows average 6000 gpd, including wastes from cabins and trailers and the Lodge. The polishing pond overflows only during periods of peak loading.

Effluent Data:

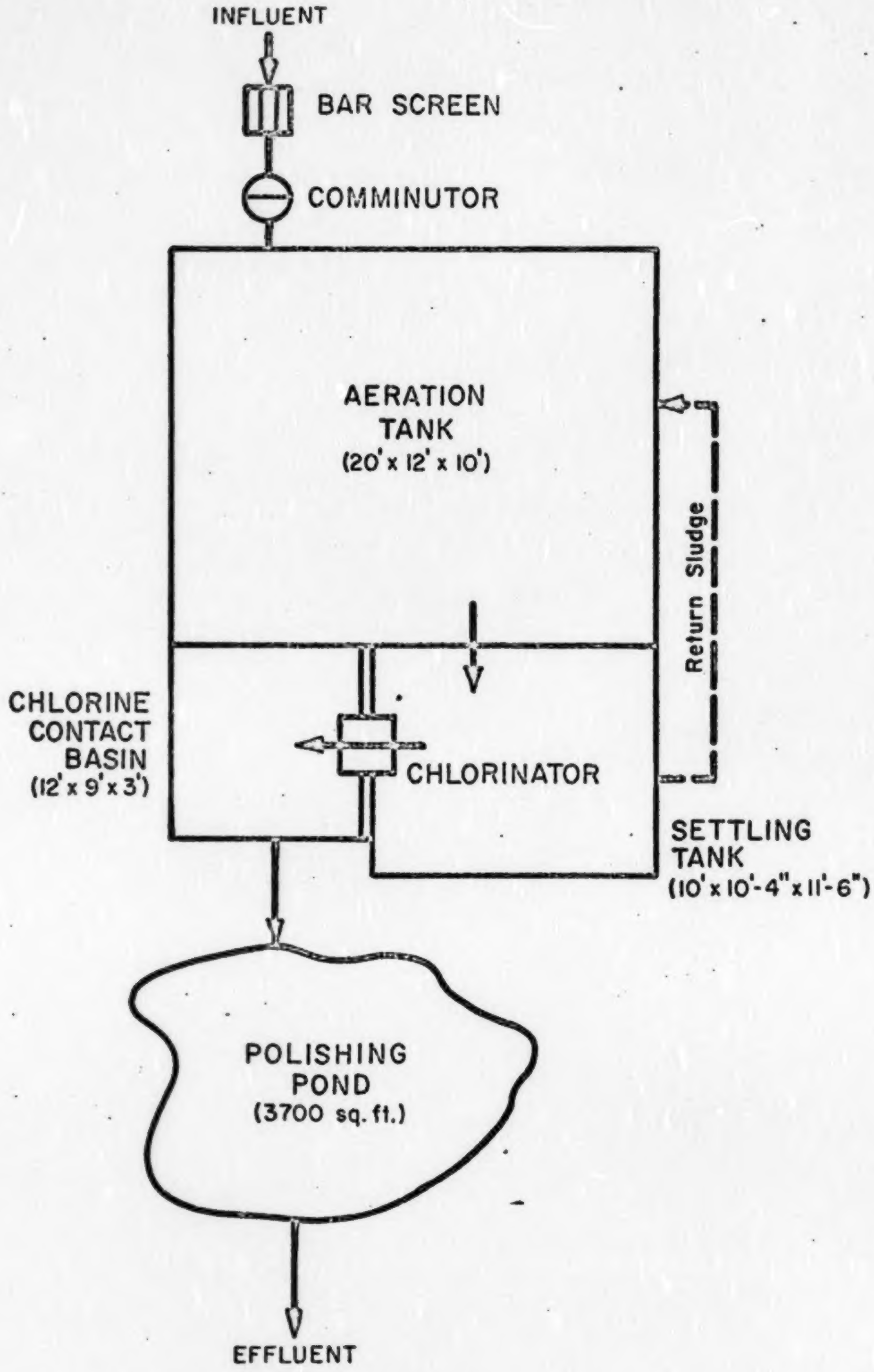
Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
7/19/66 1015	7.6	80	286	23	23	1.0	$1.3\text{x}10^6$	49,000	0.7
8/24/66 1235	7.0	46	230	61	55	0.1	$3.3\text{x}10^6$	13,000	--

U. S. NATIONAL PARK SERVICE HOUSING AND UTILITY AREA

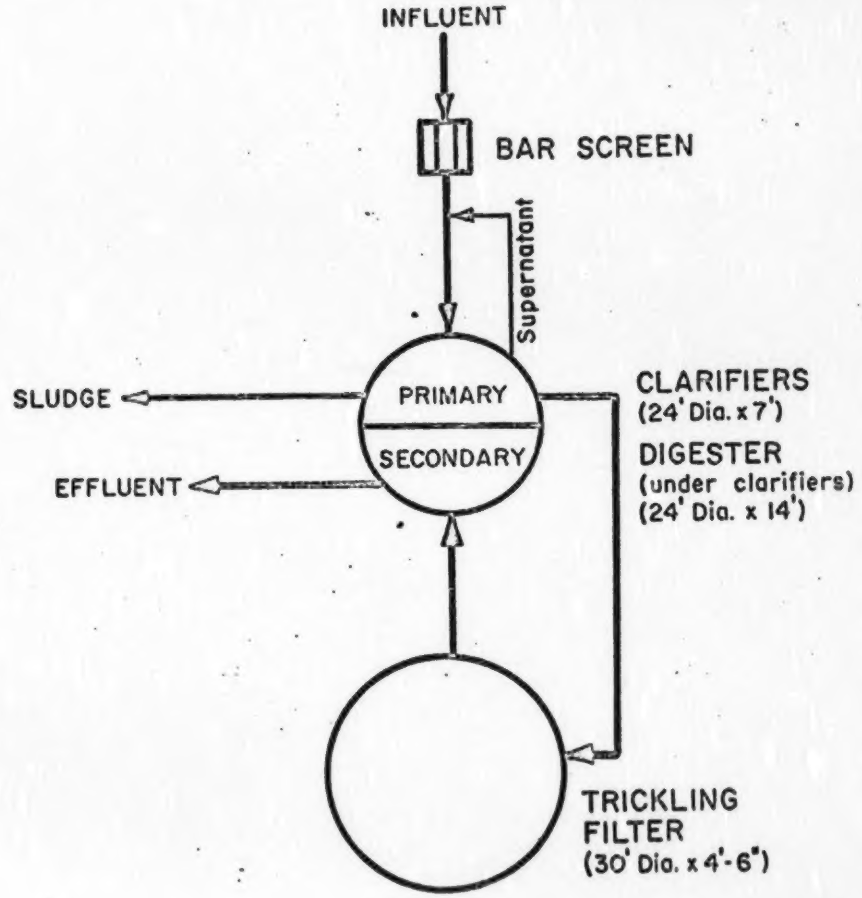
Type of Treatment: Secondary-Trickling Filter
Population Served: 150

The National Park Service Housing and Utility Area is located two miles west of Estes Park on the north side of State Highway 262. The facilities are in use year around supporting a summer-time population of 400. The effluent from the treatment plant (see diagram) is discharged to Beaver Brook, RM 260.4-61.6-0.7, a tributary of the Big Thompson River.

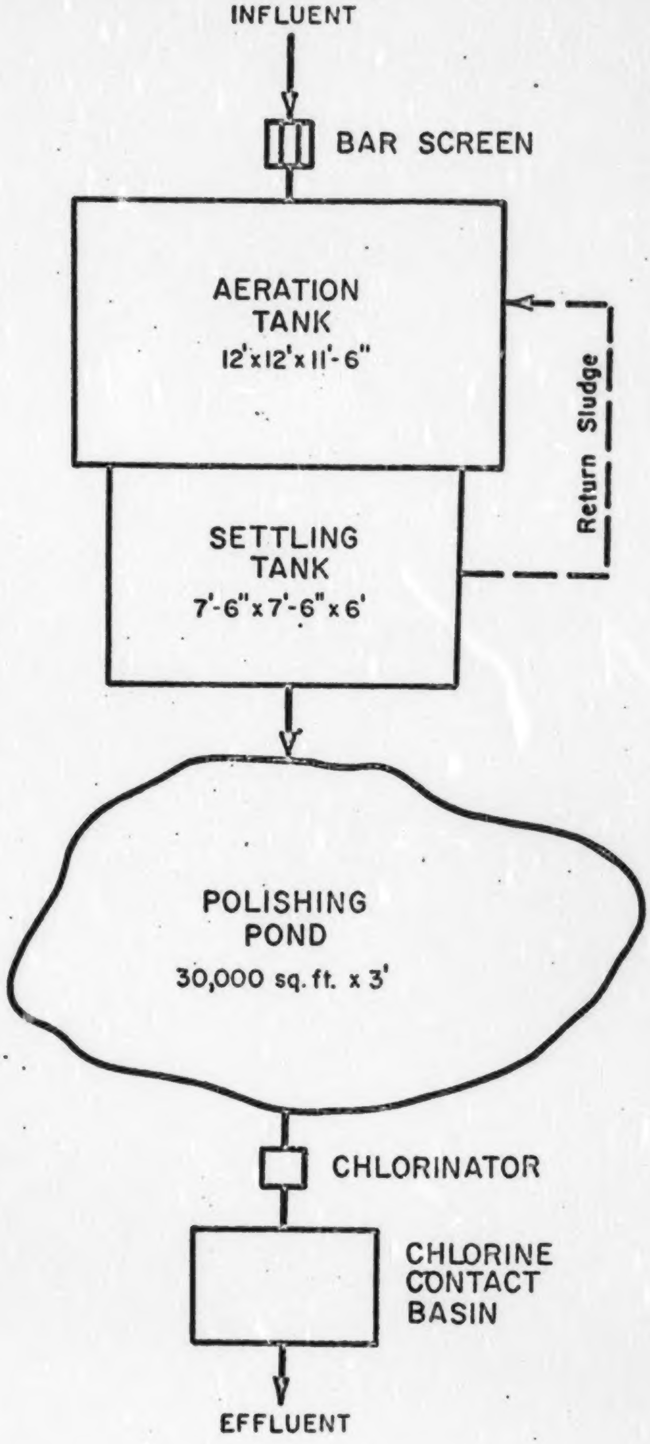
NATIONAL PARK VILLAGE SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
COMMINUTOR
AERATION TANK
(20' x 12' x 10')
Return Sludge
CHLORINE CONTACT BASIN
(12' x 9' x 3')
CHLORINATOR
SETTLING TANK
(10' x 10'-4" x 11'-6")
POLISHING POND
(3700 sq. ft.)
EFFLUENT

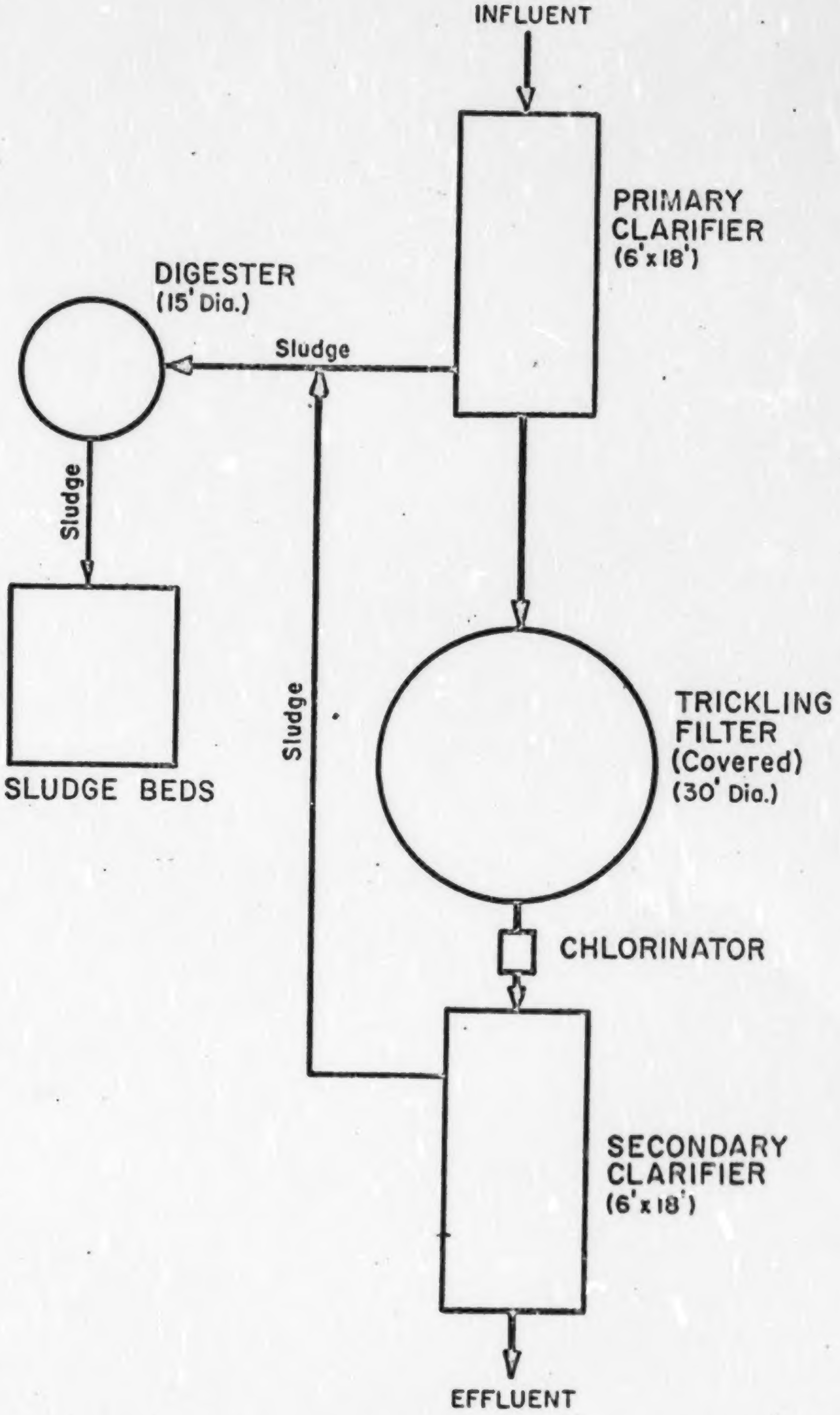
NORTH COLLEGE AVENUE SANITATION DISTRICT SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
Supernatant
SLUDGE
PRIMARY
SECONDARY
EFFLUENT
CLARIFIERS
(24' Dia. x 7')
DIGESTER
(under clarifiers)
(24' Dia. x 14')
TRICKLING
FILTER
(30' Dia. x 4'-6")

THUNDER MOUNTAIN LODGE SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
AERATION TANK
12'x12'x11'-6"
Return Sludge
SETTLING TANK
7'-6"x7'-6"x6'
POLISHING POND
30,000 sq. ft. x 3'
CHLORINATOR
CHLORINE CONTACT BASIN
EFFLUENT

U. S. NATIONAL PARK SERVICE
HOUSING AND UTILITY AREA
SEWAGE TREATMENT PLANT


INFLUENT
PRIMARY CLARIFIER (6'x18')
DIGESTER (15' Dia.)
Sludge
Sludge
SLUDGE BEDS
Sludge
TRICKLING FILTER (Covered) (30' Dia.)
CHLORINATOR
SECONDARY CLARIFIER (6'x18')
EFFLUENT

SAMPLING DATA

U. S. NATIONAL PARK SERVICE HOUSING AND UTILITY AREA SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1	Cl Res. mg/1
EFFLUENT														
7/14/66	1430	Grab	18	6.9	--	139	487	28	25	<0.1	330	7.8	2.2	1.8
8/23/66	1210	Grab	16	7.2	50	172	510	36	31	0.1	33,000	1,300	--	--
8/24/66	1400	Grab	17	7.4	39	142	510	29	26	0.1	46,000	700	--	--
Average			17	7.2	45	151	502	31	27	<0.1	33,000	700	2.2	1.8
INFLUENT														
7/14/66	1430	Grab	17	7.5	232	488	565	118	96	2.3	--	--	5.9	--
8/23/66	1000	Grab	17	7.4	94	299	364	104	91	5.5	--	--	3.2	--
8/24/66	1400	Grab	20	7.7	188	287	658	82	68	2.0	--	--	--	--
Average			18	7.5	171	358	529	101	85	3.3	--	--	4.6	--
PERCENT REMOVALS					74			70	68	>97				

WELLINGTON

Type of Treatment: Primary-Imhoff Tank
Population Served: 600

The Wellington sewage treatment plant is located about one-quarter mile south of the community and discharges effluent to Boxelder Creek, RM 249.0-38.7-14.6, a tributary of the Cache la Poudre River. The facility has been in operation since 1925 and provides treatment for an average flow of about 40,000 gpd. The general condition of the plant indicates that little maintenance, if any, is performed. Wellington is considering an aerated lagoon to replace the existing facility.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
6/7/66 1400	7.4	125	247	71	61	0.5	23.x10^{6}	4.9x10^{6}	7.8
6/14/66 0900	7.5	119	247	64	62	0.8	33.x10^{6}	23.0x10^{6}	3.1

YMCA CONFERENCE CAMP

Type of Treatment: Secondary-Extended Aeration
Population Served: 3000

The YMCA Conference Camp is located about three and one-half miles southwest of Estes Park adjacent to State Highway 262. Effluent from the plant (see diagram) discharges into Glacier Creek, RM 260.4-63.6-0.4, a tributary of the Big Thompson River. The facility, constructed in 1959, serves a summer population of 1500 to 3000. The average flow was approximately 80,000 gpd. Additions, including disinfection facilities, are scheduled for completion in late 1967.

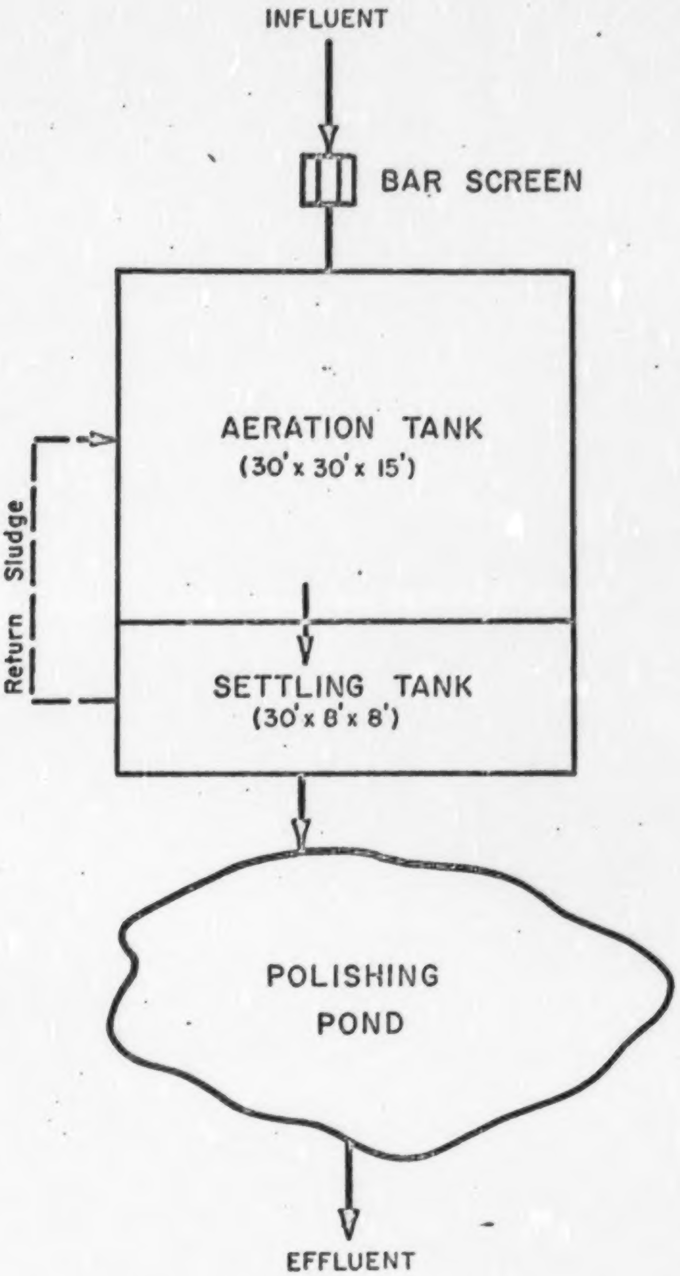
Logan County

CROOK SANITATION DISTRICT

Type of Treatment: Primary-Imhoff Tank
Population Served: 220

The Crook Sanitation District treatment plant is located near the northeast corner of the community. About 20,000 gpd of effluent enters into an irrigation ditch, RM 125.6-2.6-3.2, which is part of the Harmony Canal system. Facilities are limited to an Imhoff Tank constructed in 1952. Adequate treatment including disinfection is needed.

Y. M. C. A. CONFERENCE CAMP SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
AERATION TANK
(30' x 30' x 15')
Return Sludge
SETTLING TANK
(30' x 8' x 8')
POLISHING POND
EFFLUENT

SAMPLING DATA
Y. M. C. A. CONFERENCE CAMP SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
7/19/66	1130	Grab	20	8.7	39	176	384	45	45	<0.1	490,000	33,000	1.2
8/23/66	1340	Grab	19	8.4	39	182	567	72	67	<0.1	13,000,000	2,300,000	1.1
8/24/66	1000	Grab	18	8.0	50	185	600	73	70	<0.1	4,900,000	2,300,000	--
Average			19	8.4	42	181	517	63	60	<0.1	4,900,000	2,300,000	1.2
INFLUENT													
7/19/66	1130	Grab	19	7.6	70	171	221	61	49	3.0	--	--	1.1
8/23/66	1340	Grab	20	8.2	215	545	704	56	56	12.0	--	--	1.7
8/24/66	0955	Grab	21	8.0	345	825	510	355	226	7.5	--	--	--
Average			20	8.0	210	517	478	157	110	7.5			1.4
PERCENT REMOVALS					80			60	46	>99			

SAMPLING DATA
CROOK SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml
EFFLUENT												
6/15/66	0945	Grab	18	7.3	142	290	4910	112	82	2.0	4,900,000	3,300,000
6/15/66	1230	Grab	17	7.3	160	240	5150	112	92	0.3	7,900,000	3,300,000
6/16/66	0845	Grab	16	7.5	95	155	5220	76	66	0.2	4,900,000	4,900,000
6/16/66	1030	Grab	17	7.6	76	183	4970	62	56	0.5	13,000,000	7,900,000
Average			17	7.4	118	217	5062	91	74	0.8	6,400,000	4,100,000
INFLUENT												
6/15/66	0945	Grab	17	7.6	220	798	5150	448	386	7.0	--	--
6/15/66	1230	Grab	17	7.4	165	330	4120	172	172	0.1	--	--
6/16/66	0845	Grab	16	7.6	130	290	4970	152	130	3.0	--	--
6/16/66	1030	Grab	17	7.6	125	294	4970	174	138	7.0	--	--
Average			17	7.6	160	428	4802	237	206	4.3	--	--
PERCENT REMOVALS					26			62	64	81		

MERINO

Type of Treatment: Secondary-Waste Stabilization Pond
Population Served: 270

The Merino sewage lagoon is located east of the community adjacent to the South Platte River, RM 164.2. The 2.6 acre pond, constructed in 1962, was not overflowing at the time of visit. The water level within the lagoon fluctuates with the water level in the River.

PEETZ SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 250

The Peetz Sanitation District sewage treatment facilities are located north of the community and north of East Lewis Creek, RM 133.3-3.5-6.5-2.8N. There has been no overflow from the two 1.3 acre waste stabilization ponds since being placed in operation during 1965.

STERLING

Type of Treatment: Secondary-Trickling Filter
Population Served: 11,600

The Sterling sewage treatment plant (see diagram) is located about one-half mile east of Northeastern Junior College and discharges effluent to the South Platte River, RM 148.6. The basic plant was built in 1961. A holding tank, primary clarifier, and trickling filter were added in September 1966 for the purpose of handling the wastes from a large meat packing plant built the same year. A chlorinator and chlorine contact basin were also completed in 1966 but the chlorinator was not placed in operation until January 1967. The treatment system was designed for a flow of 2.35 MGD, including 0.53 MGD of packing wastes from the Sterling Colorado Beef Packing Company. This design was based on a BOD load of 2560 pounds per day from domestic sewage and 3300 pounds per day from packing-plant wastes. The average daily flow to the treatment plant is 619,000 gallons of domestic wastes and 158,000 gallons of packing plant wastes. A 220,000-gallon holding tank is employed to equalize discharge by the packing company to the treatment wastes. Wastes in the holding tank are received during the evening hours. The treatment system is operated and maintained by a superintendent, one operator, and one laborer.

Limited study conducted by the Project indicates the BOD load to the treatment plant is 1,600 pounds per day from the city and 7,570 pounds during a ten-hour day from the packing plant. No samples were collected during the night-time cleanup period. A BOD load of 9,170 pounds per day was being received by the treatment plant, designed to handle a maximum of 5,860 pounds of BOD per day. At the time of the study it was evident that the packing company was wasting a large portion of the blood, grease, and paunch manure. Adequate pretreatment of all packinghouse wastes to the sanitary sewers must be accomplished and additional measures may be necessary in order for the treatment plant to perform satisfactorily.

SAMPLING DATA
STERLING SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/l	COD mg/l	Cond µmhos	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep. MPN/100 ml	ABS mg/l
EFFLUENT														
11/29/66	1400	Grab	17	8.1	120	250	2140	33	33	<0.1	33,000,000	23,000,000	12,000,000	--
11/29/66	1500	Grab	17	8.0	120	234	2160	73	65	<0.1	17,000,000	17,000,000	13,000,000	--
11/30/66	1100	Grab	15	8.0	172	310	2290	76	76	<0.1	7,900,000	7,900,000	89,000,000	--
11/30/66	1200	Grab	14	8.1	202	382	2160	105	97	0.1	33,000,000	17,000,000	44,000,000	--
12/01/66	0900	Grab	14	7.7	240	408	2240	107	104	<0.1	70,000,000	70,000,000	11,000,000	--
12/01/66	1300	Grab	14	8.0	155	306	2240	101	96	<0.1	33,000,000	33,000,000	21,000,000	--
11/29/66		Comp	--	7.8	150	348	2320	40	39	<0.1	--	--	--	0.70
11/30/66		Comp	--	8.0	250	460	2270	107	107	<0.1	--	--	--	0.74
12/01/66		Comp	--	8.1	185	385	2290	103	97	<0.1	--	--	--	0.99
Average (Grabs)			15	8.0	168	315	2205	82	78	<0.1	33,000,000	20,000,000	17,000,000	
Average (Composites)				8.0	195	396	2294	83	81	<0.1				0.81
INFLUENT (Domestic)														
11/29/66	1400	Grab	17	7.8	280	536	1400	181	165	10	49,000,000	9,500,000	12,000,000	--
11/29/66	1500	Grab	17	8.0	270	580	1650	164	145	4	--	--	--	--
11/30/66	1100	Grab	15	8.0	340	772	1745	359	293	11	70,000,000	23,000,000	3,400,000	--
11/30/66	1200	Grab	16	8.2	250	532	1280	282	245	10	49,000,000	23,000,000	2,400,000	--
12/01/66	0900	Grab	16	8.1	168	517	1930	164	151	4.5	22,000,000	4,600,000	2,100,000	--
12/01/66	1300	Grab	16	7.8	315	595	1315	277	237	10.5	33,000,000	7,900,000	1,200,000	--
11/29/66		Comp	--	8.0	275	814	1790	351	302	6	--	--	--	5.19
11/30/66		Comp	--	8.1	340	792	1620	261	227	11	--	--	--	3.06
12/01/66		Comp	--	8.2	258	625	1805	251	212	7.5	--	--	--	3.42
Average (Grabs)			16	8.0	271	589	1554	238	206	8.4	49,000,000	9,500,000	2,400,000	
Average (Composites)				8.1	291	744	1738	288	247	8.1				3.89
PERCENT REMOVAL (Composites)					33			71	67	>99				

SAMPLING DATA (continued)
STERLING SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep. MPN/100 ml	ABS mg/1
INFLUENT (Packing Plant)1/														
11/29/66	1400	Grab	35	5.9	6200	12800	3890	4250	4120	25	330,000,000	330,000,000	2,300,000,000	--
11/29/66	1500	Grab	35	6.2	5100	12150	3760	2660	2660	30	--	--	--	--
11/30/66	1100	Grab	32	6.0	5900	12560	3330	459	455	125	490,000,000	490,000,000	2,360,000,000	--
11/30/66	1200	Grab	32	6.1	5200	13160	3440	2650	2620	140	790,000,000	790,000,000	2,350,000,000	--
12/01/66	0900	Grab	30	6.0	4700	13650	3290	5540	5400	160	130,000,000	130,000,000	140,000,000	--
12/01/66	1300	Grab	30	6.3	5150	12350	3500	4850	4780	135	1,300,000,000	1,300,000,000	2,900,000,000	--
11/29/66		Comp	--	6.2	5700	13600	4120	4750	4580	30	--	--	--	0.56
11/30/66		Comp	--	6.4	5900	12080	3330	4470	4400	80	--	--	--	0.36
12/01/66		Comp	--	6.8	5500	13500	3650	4860	4810	100	--	--	--	0.35
Average (Grabs)			32	6.1	5375	12778	3535	3402	3339	103	490,000,000	490,000,000	2,360,000,000	
Average (Composites)				6.5	5700	13060	3650	4693	4596	70				0.42

1/ Packing plant wastes were put into holding tank from 7:00 AM to 5:00 PM and then released to the treatment plant over an 8-hour period starting at 5:00 PM. Samples were taken from wet well used for pumping of wastes to holding tank.

Laboratory analyses are required to monitor the influent and effluent and to maintain proper plant control. The quantity, as well as strength of packing-plant wastes, should be monitored to provide suitable information on characteristics of discharge of the Sterling Colorado Beef Packing Company.

Morgan County

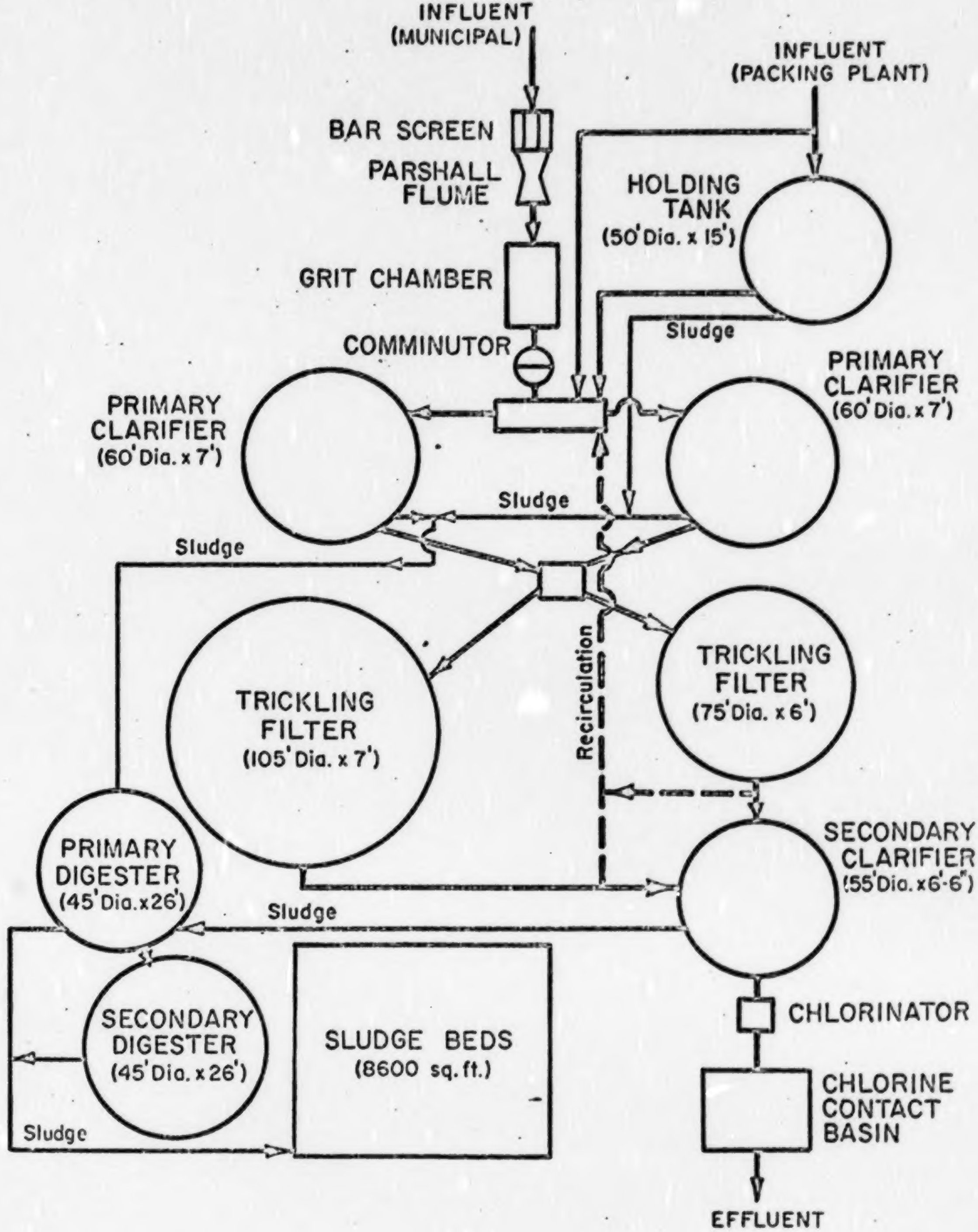
BRUSH

Type of Treatment: Secondary-Trickling Filter
Population Served: 4000

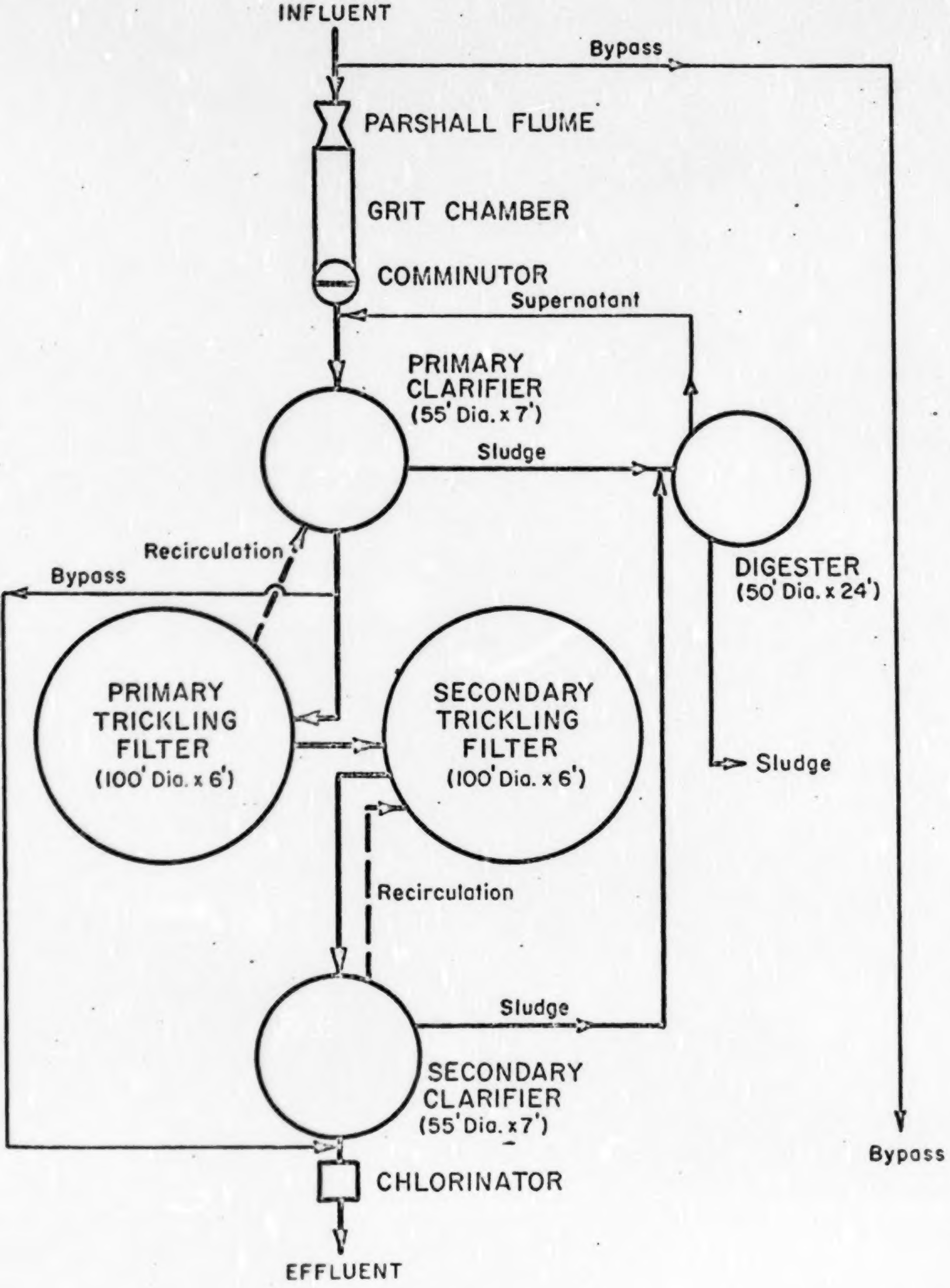
The Brush sewage treatment plant (see diagram) is located two and one-half miles north of the community, with effluent discharge to the South Platte River, RM 185.6. The original plant was destroyed in the 1965 flood. A new treatment works was placed into operation in November 1966. Wastes originate from the community and the Sigman Packing Company. The design loading is 0.75 MGD with 1500 pounds of BOD per day for domestic wastes, and 0.37 MGD with 3000 pounds of BOD per day for packing plant wastes. The average combined flow is 0.55 MGD, including about 0.34 MGD from the packing plant. Sludge from the digester is hauled to a public landfill. Chlorination facilities were not in use when visited. A 1200-foot outfall serves as the chlorine contact chamber. Operating personnel consist of one full-time operator and one laborer working 32 hours per week. No laboratory analyses are performed. Charts are kept on daily flows, both influent and effluent.

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml
EFFLUENT 1/10/67 1345	8.0	92	190	51	46	0.1	1.1×10^9	1.1×10^9
INFLUENT 1/10/67 1345	6.5	3300	4360	460	430	4.0	330×10^6	330×10^6

STERLING
SEWAGE TREATMENT PLANT


INFLUENT
(MUNICIPAL)
INFLUENT
(PACKING PLANT)
BAR SCREEN
PARSHALL
FLUME
HOLDING
TANK
(50' Dia. x 15')
GRIT CHAMBER
Sludge
COMMINUTOR
PRIMARY
CLARIFIER
(60' Dia. x 7')
PRIMARY
CLARIFIER
(60' Dia. x 7')
Sludge
Sludge
TRICKLING
FILTER
(105' Dia. x 7')
Recirculation
TRICKLING
FILTER
(75' Dia. x 6')
PRIMARY
DIGESTER
(45' Dia. x 26')
SECONDARY
CLARIFIER
(55' Dia. x 6'-6")
Sludge
SECONDARY
DIGESTER
(45' Dia. x 26')
SLUDGE BEDS
(8600 sq. ft.)
CHLORINATOR
CHLORINE
CONTACT
BASIN
Sludge
EFFLUENT

BRUSH
SEWAGE TREATMENT PLANT


INFLUENT
Bypass
PARSHALL FLUME
GRIT CHAMBER
COMMINUTOR
Supernatant
PRIMARY CLARIFIER (55' Dia. x 7')
Sludge
DIGESTER (50' Dia. x 24')
Recirculation
Bypass
PRIMARY TRICKLING FILTER (100' Dia. x 6')
SECONDARY TRICKLING FILTER (100' Dia. x 6')
Sludge
Recirculation
Sludge
SECONDARY CLARIFIER (55' Dia. x 7')
CHLORINATOR
EFFLUENT
Bypass

FORT MORGAN

Type of Treatment: Secondary-Trickling Filter
Population Served: 8100

The Fort Morgan sewage treatment plant (see diagram) is located on the east side of the city near East River View Avenue and releases effluent to the South Platte River, RM 195.2. The plant's hydraulic capacity is 2.0 MGD and the average flow is 1.5 MGD. The primary treatment facilities were placed in operation in 1956 and the secondary units added in 1961. Chlorination facilities are not provided. Difficulty was reported in keeping the sludge line open from the primary clarifier to the digester.

One full-time operator is furnished assistance by city laborers upon request. A limited amount of laboratory equipment is provided. Analyses are performed by the operator which include pH and BOD of the effluent three times per week. Laboratory records and influent flow charts are kept. Analyses of samples collected prior to the closing of the Fort Morgan Dressed Beef Packing plant in October 1966 are given in the table on page 66.

LOG LANE VILLAGE SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 400

Log Lane Village is located two miles west of Fort Morgan, and its treatment facilities are located adjacent to the South Platte River, RM 199.9, on the east side of the community. The lagoon system constructed in 1961 consists of two cells with a total surface area of 3.5 acres. At the time of visit it was noted that the divider between the cells had been washed away and the banks were sloughing in several places. The ponds were not overflowing and the water level appeared to fluctuate with the River level.

Sedgwick County

JULESBURG

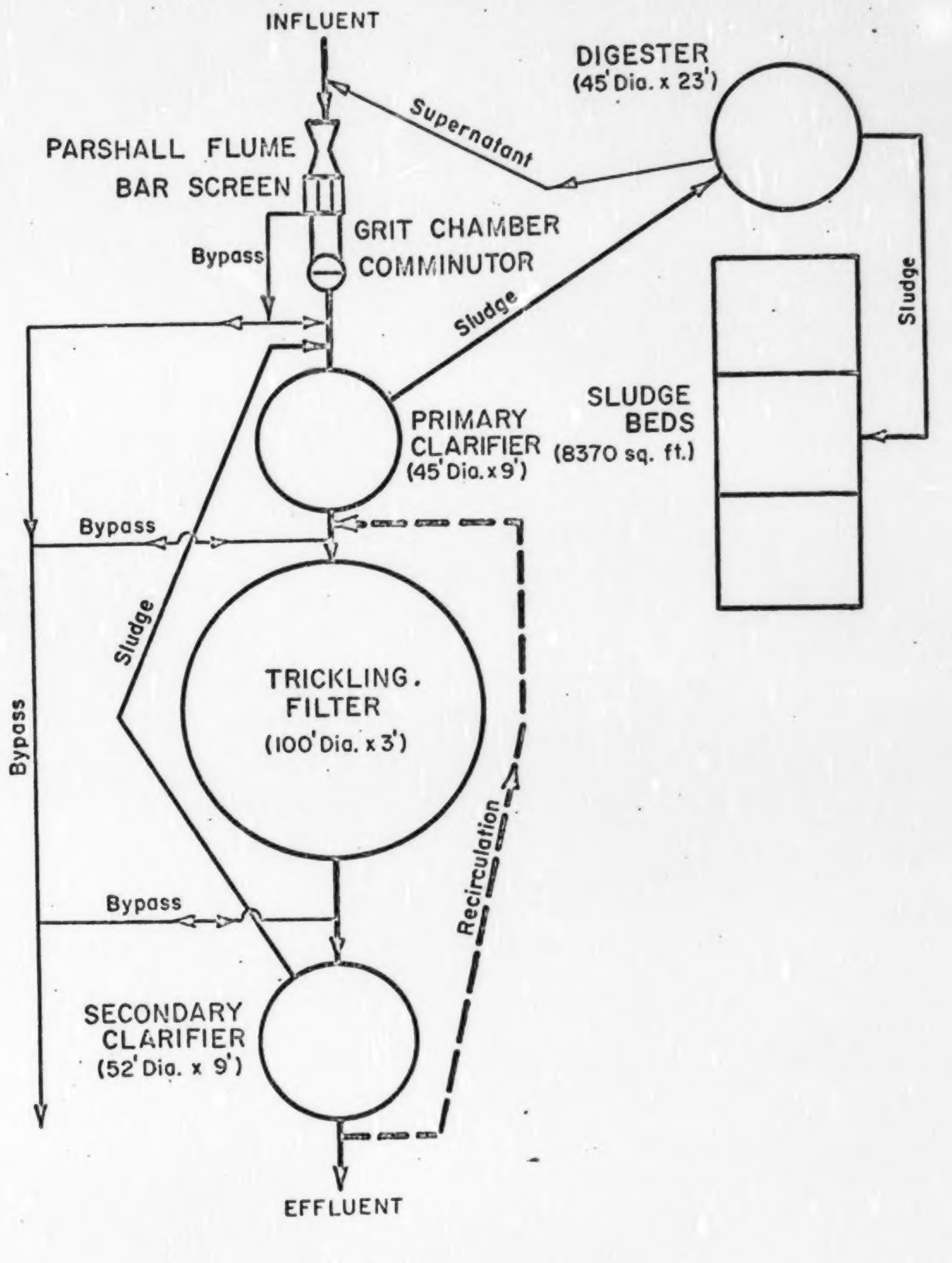
Type of Treatment: Secondary-Trickling Filter
Population Served: 1880

The Julesburg sewage treatment plant (see diagram) is located adjacent to U. S. Highway 385 approximately one-half mile southeast of the community and discharges effluent to the South Platte River, RM 86.9. The plant was constructed in 1959 with a capacity of 0.295 MGD. Waste loads are of domestic origin with an average flow of 0.251 MGD. During the summer peak flows are in excess of plant capacity caused by large volumes of water from cooling units in commercial establishments. The digester is not heated. In February 1967 it was reported the digester had

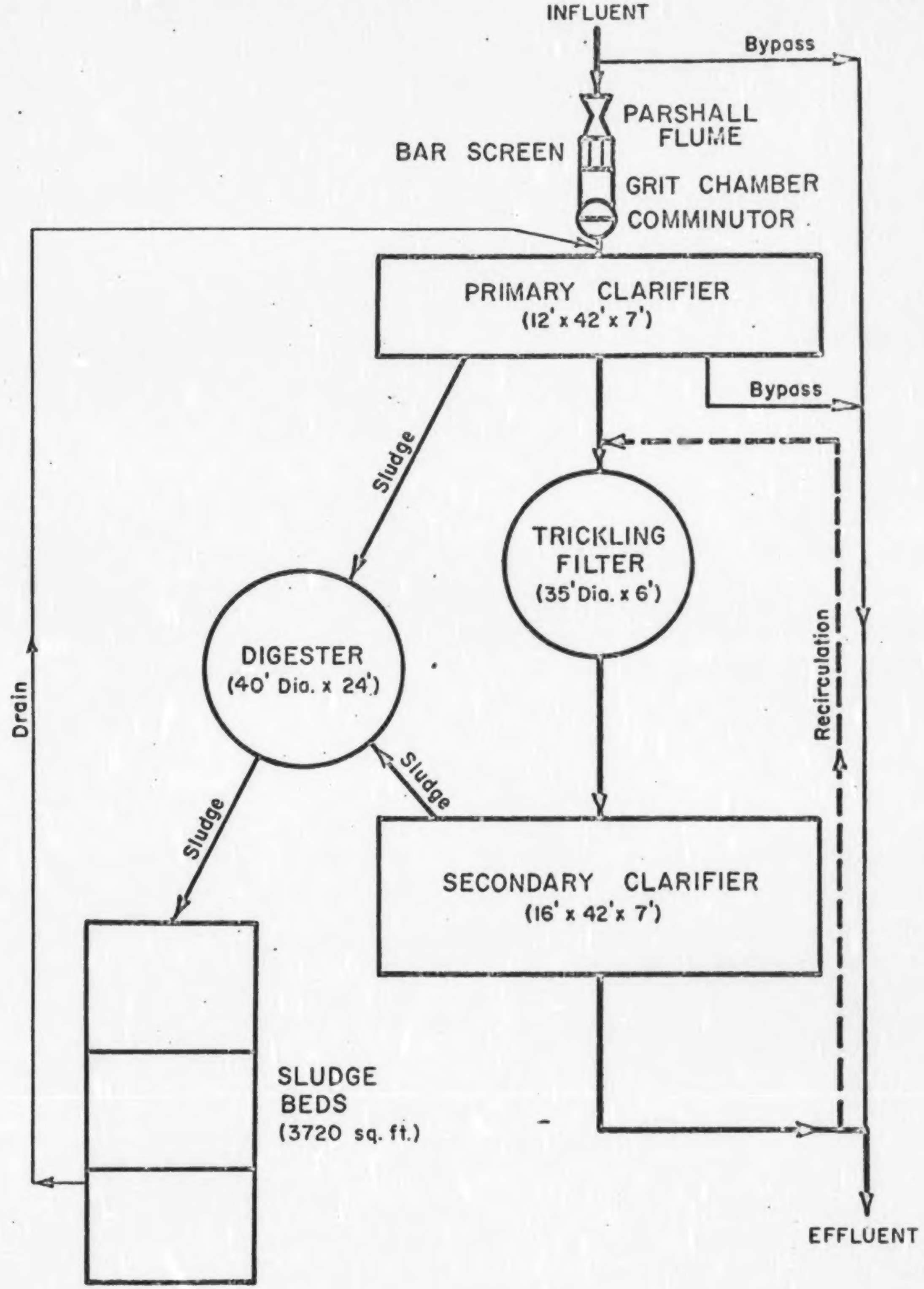
SAMPLING DATA
FORT MORGAN SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
6/28/66	0800	Grab	--	7.5	23	73	3270	20	17	<0.1	23,000,000	13,000,000	--
6/28/66	1100	Grab	--	7.5	40	98	4100	34	28	<0.1	49,000,000	49,000,000	--
6/28/66	1300	Grab	--	7.5	90	213	4975	76	67	<0.1	330,000,000	170,000,000	--
6/29/66	1200	Grab	23	7.6	86	244	4600	71	63	0.1	170,000,000	49,000,000	--
6/29/66	1400	Grab	23	7.7	86	181	4070	59	54	<0.1	230,000,000	230,000,000	--
6/29/66	1500	Grab	23	7.7	79	212	4240	63	58	0.1	79,000,000	49,000,000	--
6/30/66	0900	Grab	22	7.5	30	71	3260	20	20	<0.1	18,000,000	9,500,000	--
6/30/66	1000	Grab	24	7.5	26	69	3600	16	16	0.1	7,900,000	3,300,000	--
6/30/66	1100	Grab	25	7.5	36	94	4175	27	26	<0.1	17,000,000	11,000,000	--
6/28/66		Comp	--	7.6	51	138	4020	44	39	<0.1	--	--	1.9
6/29/66		Comp	--	7.7	68	128	3920	42	38	<0.1	--	--	1.4
6/30/66		Comp	--	7.6	56	130	3870	42	40	<0.1	--	--	2.2
Average (Grabs)			23	7.6	55	139	4032	43	39	<0.1	49,000,000	49,000,000	
Average (Composites)				7.7	58	132	3937	43	39	<0.1			1.8
INFLUENT													
6/28/66	0800	Grab	--	7.3	340	897	4020	364	318	7.0	--	--	--
6/28/66	1100	Grab	--	7.2	305	807	4020	372	310	4.5	--	--	--
6/28/66	1300	Grab	--	7.2	330	800	5500	354	300	4.5	--	--	--
6/29/66	1200	Grab	21	7.2	385	905	3020	644	572	10.0	--	--	--
6/29/66	1400	Grab	21	7.2	315	667	3030	238	212	4.0	--	--	--
6/29/66	1500	Grab	23	7.2	325	775	5040	314	279	4.5	--	--	--
6/30/66	0900	Grab	19	7.3	495	882	8040	360	318	8.0	--	--	--
6/30/66	1000	Grab	20	7.3	415	826	3600	392	350	7.0	--	--	--
6/30/66	1100	Grab	21	7.4	388	1040	3600	638	586	7.0	--	--	--
6/28/66		Comp	--	7.4	440	760	4545	384	334	5.0	--	--	4.3
6/29/66		Comp	--	7.4	345	830	4240	442	398	7.0	--	--	2.4
6/30/66		Comp	--	7.3	560	866	4970	380	346	5.0	--	--	4.9
Average (Grabs)			21	7.3	367	844	4430	408	361	6.3	--	--	--
Average (Composites)				7.4	448	818	4585	402	359	5.7			3.9
PERCENT REMOVALS					87			89	89	>98			

FORT MORGAN
SEWAGE TREATMENT PLANT


INFLUENT
DIGESTER
(45' Dia. x 23')
Supernatant
PARSHALL FLUME
BAR SCREEN
GRIT CHAMBER
Bypass
COMMINUTOR
Sludge
Sludge
SLUDGE
BEDS
(8370 sq. ft.)
PRIMARY
CLARIFIER
(45' Dia. x 9')
Bypass
Sludge
TRICKLING.
FILTER
(100' Dia. x 3')
Bypass
Recirculation
Bypass
SECONDARY
CLARIFIER
(52' Dia. x 9')
EFFLUENT

JULESBURG SEWAGE TREATMENT PLANT


INFLUENT
Bypass
PARSHALL FLUME
BAR SCREEN
GRIT CHAMBER
COMMINUTOR
PRIMARY CLARIFIER
(12' x 42' x 7')
Bypass
Sludge
TRICKLING FILTER
(35' Dia. x 6')
DIGESTER
(40' Dia. x 24')
Recirculation
Drain
Sludge
Sludge
SECONDARY CLARIFIER
(16' x 42' x 7')
SLUDGE BEDS
(3720 sq. ft.)
EFFLUENT

SAMPLING DATA
JULESBURG SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
6/14/66	0800	Grab	18	7.7	52	127	2080	39	34	0.2	3,500,000	210,000	--
6/14/66	1100	Grab	19	7.4	195	382	2210	69	60	8.0	64,000,000	17,000,000	--
6/14/66	1300	Grab	20	7.6	66	159	2140	206	188	1.5	17,000,000	3,300,000	--
6/15/66	0900	Grab	18	7.7	29	97	2390	20	20	<0.1	3,300,000	700,000	--
6/15/66	1315	Grab	20	7.8	39	129	2190	33	28	<0.1	49,000,000	1,700,000	--
6/15/66	1500	Grab	20	7.7	42	119	2240	31	28	<0.1	4,900,000	790,000	--
6/16/66	1000	Grab	18	7.9	34	111	2490	28	28	<0.1	3,300,000	790,000	--
6/16/66	1200	Grab	19	7.9	42	121	2320	30	29	<0.1	3,300,000	1,700,000	--
6/16/66	1400	Grab	20	7.9	36	109	2370	27	26	0.1	2,300,000	490,000	--
6/14/66		Comp	--	7.5	96	227	2140	112	106	3.5	--	--	2.8
6/15/66		Comp	--	7.8	38	93	2450	47	35	<0.1	--	--	1.2
6/16/66		Comp	--	7.9	42	99	2370	37	36	<0.1	--	--	1.6
Average (Grabs)			19	7.7	60	150	2270	54	50	<1.1	3,500,000	790,000	
Average (Composites)				7.7	59	140	2320	65	59	<1.2			1.9
INFLUENT													
6/14/66	0800	Grab	18	7.0	520	895	2160	420	366	30.0	--	--	--
6/14/66	1100	Grab	19	7.4	290	530	2080	346	314	7.5	--	--	--
6/14/66	1300	Grab	20	7.6	175	458	1960	198	178	2.5	--	--	--
6/15/66	0900	Grab	18	7.7	265	520	2190	392	388	10.0	--	--	--
6/15/66	1315	Grab	14	7.5	225	475	1720	812	788	5.0	--	--	--
6/15/66	1500	Grab	19	7.4	290	540	1780	816	798	2.0	--	--	--
6/16/66	1000	Grab	19	7.5	325	704	2430	540	492	7.0	--	--	--
6/16/66	1200	Grab	19	7.4	145	294	2130	96	96	2.0	--	--	--
6/16/66	1400	Grab	20	7.6	275	824	2180	220	190	5.0	--	--	--
6/14/66		Comp	--	7.3	255	665	2000	372	350	6.0	--	--	4.0
6/15/66		Comp	--	7.4	215	565	1950	258	242	3.5	--	--	3.6
6/16/66		Comp	--	7.6	290	1130	2320	514	496	5.0	--	--	5.5
Average (Grabs)				7.5	279	582	2070	427	401	7.9			
Average (Composites)				7.4	253	787	2090	381	363	4.9			4.4
PERCENT REMOVALS (Composites)					77			83	84	>76			

not been emptied in two years. Prior inspections revealed that sludge is discharged to the River. No disinfection facilities are available. A part-time operator devotes about 15 hours per week in the operation and maintenance of the plant. Essentially no laboratory equipment is available but periodic limited laboratory analyses are performed by the Northeast Colorado Health Department. Daily flow charts are kept for one year but no other operating records are maintained.

Results of samples collected are tabulated in the table on page 67. On June 14 and until 8:30 a.m. on June 15 a significant portion of the plant influent was bypassed to the River due to valve malfunction. On June 15 and 16 approximately 60 gpm were bypassed during the peak flow period, 10:00 a.m. to 2:00 p.m., because of overloading. A portion of effluent from the primary clarifier was bypassed to the final effluent on February 23, 1967. Also, on other occasions, valves were found opened that allowed the plant influent or partially treated sewage to be bypassed to the River. Sampling by the Northeast Colorado Health Department indicates that plant performance has varied considerably and at times there is practically no waste removal. An engineering study should be undertaken to determine additions and operational changes needed.

OVID

Type of Treatment: None
Population Served: 550

Ovid discharges approximately 60,000 gpd of untreated sewage to Lodgepole Creek, RM 95.2-0.3, via a sewer collection system. A lagoon system is scheduled for construction in the near future. A slaughterhouse and sugar factory are located in the community but these industries are not connected to the municipal collection system.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
6/14/66									
0845	7.6	200	692	348	330	3.5	130×10^6	2.3×10^6	5.7
1015	7.6	240	382	162	146	2.0	49×10^6	33.0×10^6	--
6/15/66									
1045	7.9	260	559	208	174	11.0	23×10^6	23.0×10^6	--
1245	7.6	250	510	260	216	9.0	49×10^6	23.0×10^6	--
6/16/66									
0815	8.1	360	795	750	676	23.0	230×10^6	79.0×10^6	4.6
0930	8.1	365	666	482	416	22.0	230×10^6	79.0×10^6	--
Average									
	7.8	279	601	368	326	11.8	89×10^6	23.0×10^6	5.1

AULT SANITATION DISTRICT

Type of Treatment: Secondary-Trickling Filter
Population Served: 810

The Ault Sanitation District sewage treatment plant (see diagram), located one-half mile south of the town and three miles west of Lone Tree Creek, RM 248.2-17.8-3.0W, discharges effluent into a pond for subsequent irrigation of farm crops. The collection and treatment systems were built in 1952 with a rated capacity of 150,000 gpd. It appears that little attention is paid to the operation and maintenance of the plant and records indicate the trickling filter has not been used since 1960.

Effluent Data:

Date Time	pH	BOD mg/1	COD mg/1	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/1
6/15/66 1000	7.3	330	532	286	284	5.5	$1.3\text{x}10^{9}$	$21.0\text{x}10^{6}$	7.2
6/20/66 1130	7.2	350	597	132	114	3.0	$70.0\text{x}10^{9}$	$33.0\text{x}10^{6}$	4.9

EATON

Type of Treatment: Primary-Septic Tank and Sand Filters
Population Served: 1300

The Eaton sewage treatment facilities (see diagram) are located approximately one mile southeast of the community and discharge effluent to Eaton Draw, RM 249.0-6.9-6.6, a tributary of the Cache la Poudre River. Results of a five-day sampling program performed at the plant are shown in the table on pages 70-71.During this period about one-third of the influent was bypassed to Eaton Draw apparently due to a clogged screen.

The general condition of the septic tank and sand filters is poor and frequent ponding of the filters occurs. Eaton has submitted a preliminary engineering report to the State Water Pollution Control Commission.

SAMPLING DATA
EATON SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep. MPN/100 ml
EFFLUENT [1/]													
11/15/65	1200	Grab	16	7.8	100	91	2320	52	44	<0.1	13,000,000	4,900,000	1,100,000
11/15/65	1330	Grab	15	7.8	115	102	2700	75	61	0.2	3,300,000	3,300,000	980,000
11/15/65	1600	Grab	15	7.6	115	123	2620	66	57	<0.1	22,000,000	7,000,000	690,000
11/16/65	1155	Grab	12	7.7	69	95	2400	21	21	<0.1	7,900,000	4,900,000	860,000
11/16/65	1400	Grab	13	7.6	94	127	3550	58	46	<0.1	17,000,000	7,000,000	1,250,000
11/16/65	1700	Grab	14	7.6	170	174	3240	56	45	<0.1	49,000,000	700,000	1,570,000
11/17/65	1000	Grab	14	7.6	68	101	2560	36	35	<0.1	22,000,000	11,000,000	1,590,000
11/17/65	1130	Grab	15	7.7	100	128	2650	71	65	<0.1	11,000,000	3,300,000	1,680,000
11/17/65	1540	Grab	14	7.5	130	177	2650	653	162	0.1	33,000,000	7,900,000	1,500,000
11/18/65	0925	Grab	13	7.8	82	91	2130	42	40	<0.1	28,000,000	14,000,000	890,000
11/18/65	1045	Grab	16	8.0	86	107	2290	51	50	<0.1	13,000,000	3,300,000	1,800,000
11/18/65	1510	Grab	15	7.8	96	--	2070	48	48	<0.1	7,900,000	7,900,000	1,100,000
11/19/65	0815	Grab	15	7.6	72	104	2900	62	32	<0.1	7,900,000	3,300,000	690,000
11/19/65	0935	Grab	14	7.7	93	119	3070	47	39	<0.1	17,000,000	11,000,000	800,000
11/19/65	1245	Grab	16	7.8	105	116	1590	148	44	3.0	23,000,000	7,900,000	1,240,000
11/15-16/65		Comp	--	7.7	70	75	2400	130	65	<0.1	--	--	--
11/16-17/65		Comp	--	7.6	95	112	2760	48	39	<0.1	--	--	--
11/17-18/65		Comp	--	8.0	110	95	2150	43	43	<0.1	--	--	--
11/18-19/65		Comp	--	7.8	99	114	2900	32	32	<0.1	--	--	--
Average (Grabs)			14	7.7	100	118	2543	99	53	<0.3	13,000,000	5,900,000	1,250,000
Average (Composites)				7.8	94	99	2553	63	45	<0.1			

[1/] Effluent only - Does not include bypassed sewage

SAMPLING DATA (continued)
EATON SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep. MPN/100 ml
INFLUENT													
11/15/65	1150	Grab	16	7.6	135	127	6350	128	114	2.0	70,000,000	4,900,000	400,000
11/15/65	1345	Grab	16	7.9	>340	389	1760	436	424	9.0	79,000,000	7,900,000	1,450,000
11/15/65	1550	Grab	15	7.8	97	101	2390	90	80	0.3	23,000,000	3,300,000	426,000
11/16/65	1210	Grab	15	7.6	110	162	2230	50	50	0.3	4,900,000	4,900,000	390,000
11/16/65	1400	Grab	16	7.6	>320	406	1910	180	154	7.5	22,000,000	7,000,000	1,470,000
11/16/65	1720	Grab	14	8.1	96	148	1510	97	77	0.4	4,900,000	2,300,000	250,000
11/17/65	1015	Grab	16	7.8	208	301	2420	216	176	6.0	79,000,000	13,000,000	2,700,000
11/17/65	1145	Grab	15	7.8	135	201	1960	154	113	1.2	13,000,000	4,900,000	870,000
11/17/65	1535	Grab	15	7.3	135	153	1960	40	40	1.8	13,000,000	7,900,000	1,380,000
11/18/65	0940	Grab	15	7.9	160	215	4450	202	170	8.0	46,000,000	4,900,000	3,000,000
11/18/65	1055	Grab	17	8.0	--	192	1470	143	111	1.5	17,000,000	3,300,000	760,000
11/18/65	1505	Grab	16	8.0	150	233	1760	136	122	3.5	7,900,000	2,300,000	540,000
11/19/65	0830	Grab	17	8.0	215	305	4320	276	222	10.0	13,000,000	7,900,000	2,780,000
11/19/65	0950	Grab	15	7.9	285	407	1890	566	408	11.0	17,000,000	4,900,000	1,420,000
11/19/65	1255	Grab	15	7.7	99	125	2490	48	41	<0.1	13,000,000	3,300,000	1,230,000
11/15-16/65		Comp	--	7.5	>330	>498	2040	253	90	2.0	--	--	--
11/17-18/65		Comp	--	8.2	140	137	1780	49	49	0.1	--	--	--
11/18-19/65		Comp	--	8.0	92	138	3160	59	51	0.2	--	--	--
Average (Grabs)			16	7.8	>178	231	2591	184	153	<6.2	17,000,000	4,900,000	1,230,000
Average (Composites)				7.9	>187	258	2326	120	63	0.8			
PERCENT REMOVALS (Composites)					>50			48	29	>87			

ERIE SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 1000

The Erie Sanitation District sewage lagoons are located one-half mile north of the community and overflow to Coal Creek, RM 270.0-17.4-7.9-2.5. The two ponds, completed in 1956, have a total surface area of 3.5 acres. The valve and piping arrangement limits the flexibility in operational control.

Effluent Data:

Date Time	pH	BOD mg/1	COD mg/1	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/1
6/13/66 1100	8.3	50	266	131	117	<0.1	--	--	1.3
6/14/66 1100	[illegible]	57	275	147	132	0.2	49,000	3,300	--
6/16/66 1630	9.3	49	256	150	126	0.1	70,000	1,300	2.9

EVANS

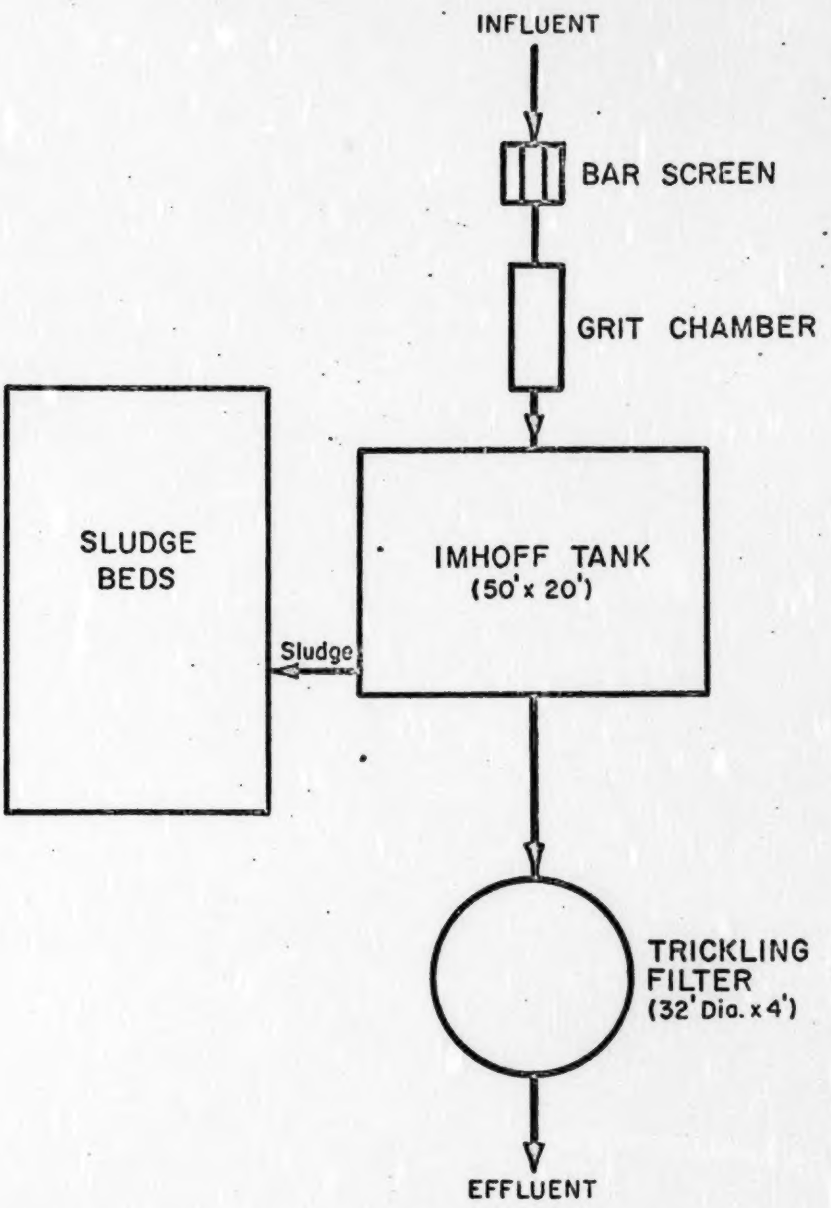
Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 3000

The Evans waste stabilization ponds are located approximately three-quarters mile east of the junction of State Highway 22 and U. S. Highway 85 and the two ponds have a total surface area of 13 acres. Approximately 0.2 MGD of effluent overflows to the South Platte River, RM 255.1. One lagoon was placed in operation during October 1961 and the second in March 1962. A diffused aeration system was incorporated in the second lagoon in 1964. The lagoon system may be operated in parallel or series.

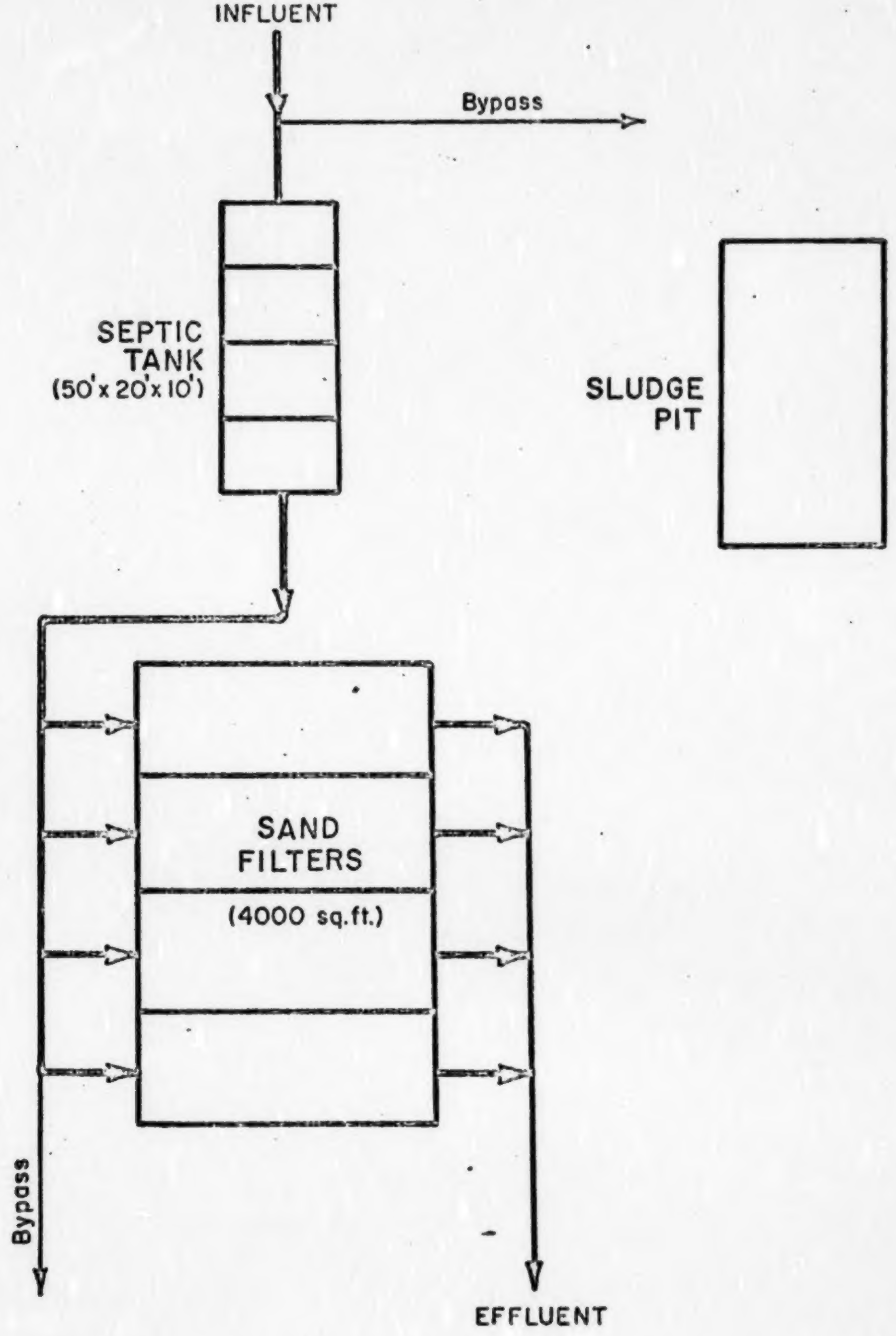
Effluent Data:

Date Time	pH	BOD mg/1	COD mg/1	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/1
6/2/66 1400	8.1	27	126	18	15	<0.1	330,000	130	2.3
6/20/66 1400	9.1	30	171	74	53	<0.1	26,000	8	1.3

AULT SANITATION DISTRICT SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
GRIT CHAMBER
SLUDGE BEDS
IMHOFF TANK (50'x 20')
Sludge
TRICKLING FILTER (32' Dia. x 4')
EFFLUENT

EATON
SEWAGE TREATMENT PLANT


INFLUENT
Bypass
SEPTIC TANK
(50'x 20'x 10')
SLUDGE PIT
SAND FILTERS
(4000 sq.ft.)
Bypass
EFFLUENT

FORT LUPTON

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 2600

Sewage from Fort Lupton is collected and routed under U. S. Highway 85 and the South Platte River to the site of the lagoon on the west side of the River. Effluent is discharged to the South Platte River, RM 287.0. The lagoon constructed in 1965 has two cells operating in parallel with a total surface area of 29 acres. Domestic wastes originate from a permanent population of 2600 and an additional transient population of about 1400 during summer and autumn. Industrial waste load from pea-canning operations is added during the 20-day summer period. The canning wastes are screened before release to the treatment system.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml
1/9/67 1015	8.9	20	102	21	17	2.0	250,000	65,000

GILCREST SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 400

The Gilcrest Sanitation District sewage lagoon is near the community on the west side of U. S. Highway 85 and 3.5 miles east of the South Platte River, RM 276.7-3.5E. The lagoon, completed in the spring of 1961, is divided by a three-foot high dike, giving a one-acre and a two-acre cell. The smaller cell was being used when visited with no overflow occurring.

GREELEY

Type of Treatment: Secondary-Activated Sludge and Trickling Filter
Population Served: 33,300

The Greeley sewage treatment facilities are located on the north and south banks of the Cache la Poudre River east of the bypass route of U. S. Highway 85 with effluent discharge to the River, RM 249.0-5.3. There are two plants. The south plant is a trickling filter installation with a capacity of 2.5 MGD. The north plant is an activated sludge installation with a capacity of 7.7 MGD (see diagrams). The south plant was constructed in 1936 and expanded in 1957; the north plant was constructed in 1965. The north plant receives the domestic waste from the city and from some small industries, including potato processing-companies. The south plant receives slaughterhouse waste from the Monfort Packing Company and domestic waste from several residences. The average flow to the north plant is

SAMPLING DATA
GREELEY SEWAGE TREATMENT PLANTS
FINAL (COMBINED) EFFLUENT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond µmhos	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/1
EFFLUENT													
4/12/66	1100	Grab	15	7.2	19	122	1270	20	20	<0.1	950	130	--
4/12/66	1300	Grab	15	7.0	<18	120	1870	24	24	<0.1	790	330	--
4/12/66	1500	Grab	15	6.9	<18	142	2170	22	22	<0.1	330	70	--
4/13/66	0900	Grab	19	7.7	<18	89	1230	22	18	<0.1	790	140	--
4/13/66	1200	Grab	19	7.3	18	106	1660	26	26	<0.1	1,300	130	--
4/13/66	1400	Grab	19	7.4	37	165	2120	36	34	<0.1	4,900	2,300	--
4/14/66	0930	Grab	14	7.5	21	120	1390	26	22	<0.1	700,000	130,000	--
4/14/66	1130	Grab	15	7.4	32	110	1610	32	30	<0.1	1,300,000	330,000	--
4/14/66	1330	Grab	16	7.5	42	142	2040	37	33	<0.1	1,700,000	700,000	--
4/12/66		Comp	--	7.1	<18	205	1465	20	20	<0.1	--	--	0.4
4/13/66		Comp	--	7.7	<18	106	1600	33	31	<0.1	--	--	0.9
4/14/66		Comp	--	7.6	39	126	1830	40	35	<0.1	--	--	1.0
Average (Grabs)			16	7.3	<30	124	1707	27	25	<0.1	1,300	330	
Average (Composites)				7.5	<25	146	1631	31	29	<0.1			0.8
PERCENT REMOVALS (Composites)					>95			92	92				

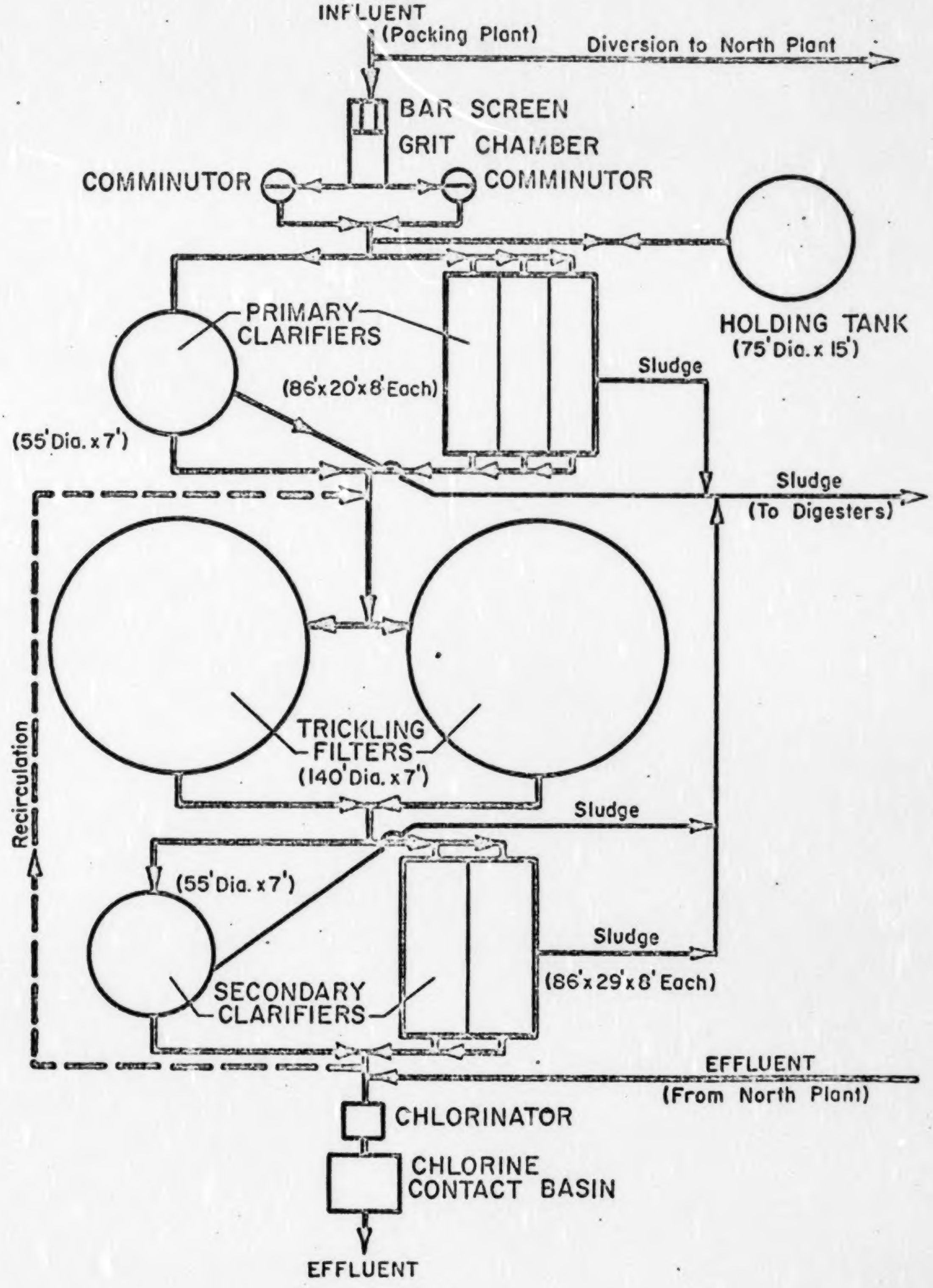
SAMPLING DATA (continued)
GREELEY NORTH SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settleable Solids ml/1	ABS mg/1
EFFLUENT											
4/12/66	1100	Grab	14	7.4	26	98	660	22	22	<0.1	--
4/12/66	1300	Grab	14	7.5	19	102	650	14	14	<0.1	--
4/12/66	1500	Grab	14	7.4	20	79	690	15	15	<0.1	--
4/13/66	0900	Grab	13	7.6	29	87	690	15	15	<0.1	--
4/13/66	1200	Grab	13	7.6	53	712	730	114	110	<0.1	--
4/13/66	1400	Grab	14	7.6	67	338	755	120	119	<0.1	--
4/14/66	0930	Grab	12	7.5	32	120	715	24	24	<0.1	--
4/14/66	1130	Grab	13	7.6	25	122	715	30	29	<0.1	--
4/14/66	1330	Grab	14	7.6	41	177	750	32	30	<0.1	--
4/12/66		Comp	--	7.2	27	87	670	12	12	<0.1	0.9
4/13/66		Comp	--	7.6	48	372	745	92	88	<0.1	1.2
4/14/66		Comp	--	7.5	35	275	695	20	20	<0.1	1.0
Average (Grabs)			13	7.5	35	204	706	43	42	<0.1	
Average (Composites)				7.4	37	245	703	41	40	<0.1	1.0
INFLUENT											
4/12/66	1100	Grab	15	7.4	345	563	730	247	216	9.5	--
4/12/66	1300	Grab	15	7.3	280	895	705	210	187	3.5	--
4/12/66	1500	Grab	16	7.3	265	705	695	181	162	4.5	--
4/13/66	0900	Grab	15	7.2	>1380	1970	995	310	294	10.5	--
4/13/66	1200	Grab	15	7.3	360	571	725	217	197	7.5	--
4/13/66	1400	Grab	15	7.4	370	925	705	183	164	4.5	--
4/14/66	0930	Grab	15	6.7	>1370	2380	1090	190	167	9.0	--
4/14/66	1130	Grab	15	7.2	455	1170	770	375	313	11.0	--
4/14/66	1330	Grab	15	7.3	285	485	695	132	118	5.0	--
4/12/66		Comp	--	7.4	370	802	755	364	332	7.0	2.3
4/13/66		Comp	--	7.4	530	1050	820	220	196	6.0	4.3
4/14/66		Comp	--	7.5	640	1080	925	235	197	7.5	7.5
Average (Grabs)			15	7.2	>567	1074	790	227	202	7.2	
Average (Composites)				7.4	511	977	834	273	242	6.8	4.7
PERCENT REMOVALS (Composites)					93			84	83	>98	

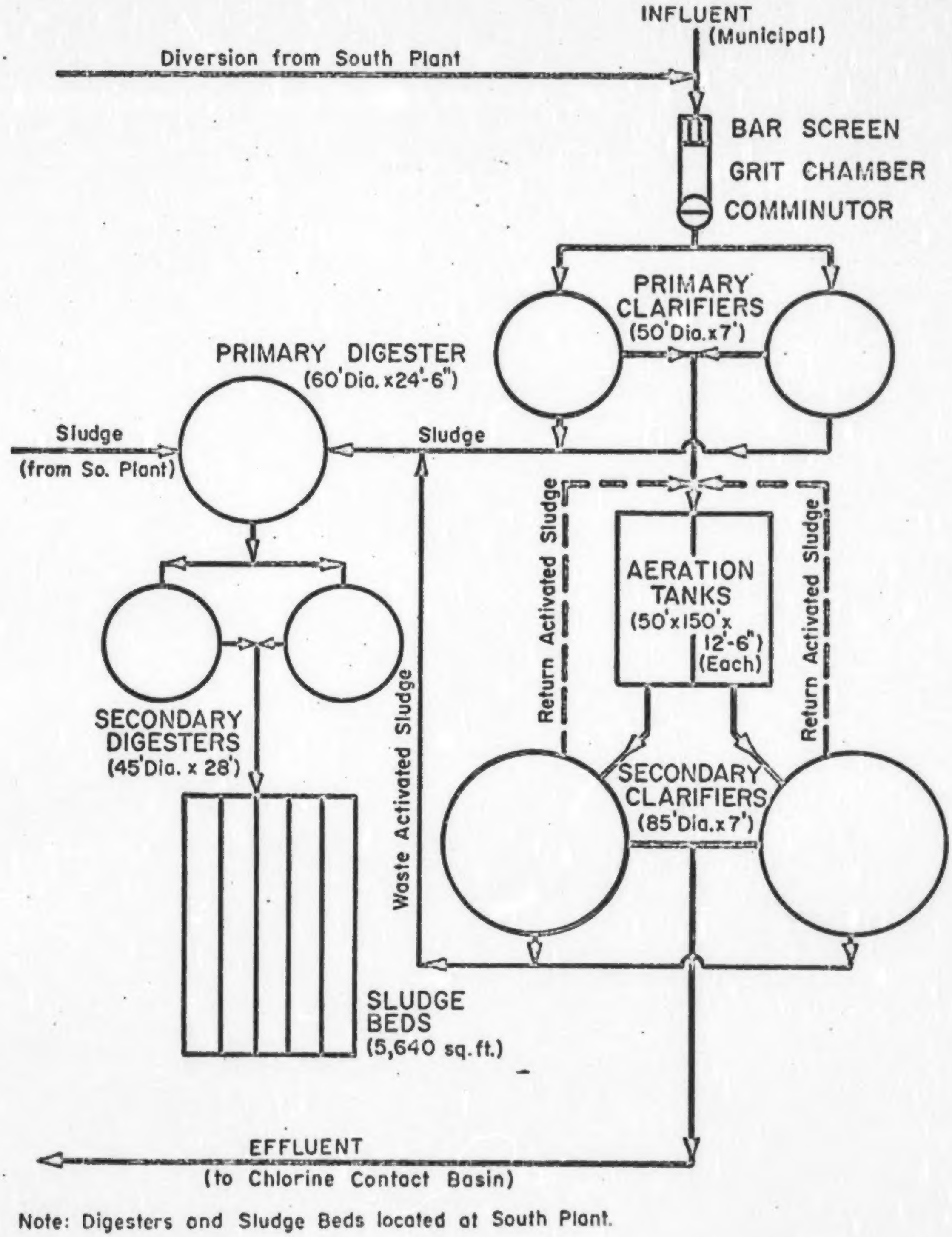
SAMPLING DATA (continued)
GREELEY SOUTH SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/1	COD mg/1	Cond umhos	TSS mg/1	VSS mg/1	Settleable Solids ml/1	ABS mg/1
EFFLUENT											
4/12/66	1100	Grab	18	7.2	26	116	2540	32	32	<0.1	--
4/12/66	1300	Grab	18	7.3	34	140	4050	34	34	<0.1	--
4/12/66	1500	Grab	18	7.3	52	173	4950	40	40	<0.1	--
4/13/66	0900	Grab	18	7.8	32	83	2180	32	32	<0.1	--
4/13/66	1200	Grab	18	7.8	34	114	3320	36	34	<0.1	--
4/13/66	1400	Grab	18	7.9	44	142	4250	43	39	<0.1	--
4/14/66	0930	Grab	18	7.8	29	87	2600	30	26	<0.1	--
4/14/66	1130	Grab	18	7.7	42	106	2820	46	34	<0.1	--
4/14/66	1330	Grab	19	7.6	59	240	3660	50	42	<0.1	--
4/12/66		Comp	--	7.3	26	126	2910	188	177	<0.1	0.2
4/13/66		Comp	--	7.8	26	102	3160	37	36	<0.1	0.8
4/14/66		Comp	--	7.5	35	130	3530	43	36	<0.1	0.9
Average (Grabs)			18	7.6	39	133	3374	38	35	<0.1	
Average (Composites)				7.5	29	119	3200	89	83	<0.1	0.6
INFLUENT											
4/12/66	1100	Grab	27	7.1	890	1610	7300	812	786	5.0	--
4/12/66	1300	Grab	27	7.0	880	1630	7900	596	592	4.5	--
4/12/66	1500	Grab	27	7.1	870	1910	2680	798	714	8.5	--
4/13/66	0900	Grab	20	7.3	485	865	5100	516	502	4.0	--
4/13/66	1200	Grab	26	7.3	910	1810	6400	622	600	7.0	--
4/13/66	1400	Grab	27	7.7	700	1110	2760	362	358	2.0	--
4/14/66	0930	Grab	18	7.3	620	1240	6600	1046	990	22.0	--
4/14/66	1130	Grab	26	7.5	830	1540	6200	614	602	8.0	--
4/14/66	1330	Grab	26	7.7	920	1690	5800	676	612	6.0	--
4/12/66		Comp	--	7.1	660	1380	5500	770	748	4.0	1.8
4/13/66		Comp	--	7.4	650	1100	5100	624	580	5.0	1.0
4/14/66		Comp	--	7.2	720	1460	6000	672	608	10.5	7.9
Average (Grabs)			25	7.3	789	1489	5635	671	640	7.4	
Average (Composites)				7.2	677	1313	5534	689	645	6.5	3.6
PERCENT REMOVALS (Composites)					96			85	87	>98	

GREELEY
SEWAGE TREATMENT PLANT
(SOUTH PLANT)


INFLUENT
(Packing Plant)
Diversion to North Plant
BAR SCREEN
GRIT CHAMBER
COMMINUTOR
COMMINUTOR
HOLDING TANK
(75' Dia. x 15')
PRIMARY
CLARIFIERS
(86' x 20' x 8' Each)
(55' Dia. x 7')
Sludge
Sludge
(To Digesters)
TRICKLING
FILTERS
(140' Dia. x 7')
Recirculation
Sludge
(55' Dia. x 7')
Sludge
(86' x 29' x 8' Each)
SECONDARY
CLARIFIERS
EFFLUENT
(From North Plant)
CHLORINATOR
CHLORINE
CONTACT BASIN
EFFLUENT

GREELEY
SEWAGE TREATMENT PLANT
(NORTH PLANT)


INFLUENT
(Municipal)
Diversion from South Plant
BAR SCREEN
GRIT CHAMBER
COMMINUTOR
PRIMARY CLARIFIERS
(50' Dia. x 7')
PRIMARY DIGESTER
(60' Dia. x 24'-6")
Sludge
(from So. Plant)
Sludge
Return Activated Sludge
Return Activated Sludge
AERATION TANKS
(50' x 150' x 12'-6")
(Each)
Waste Activated Sludge
SECONDARY DIGESTERS
(45' Dia. x 28')
SECONDARY CLARIFIERS
(85' Dia. x 7')
SLUDGE BEDS
(5,640 sq. ft.)
EFFLUENT
(to Chlorine Contact Basin)

Note: Digesters and Sludge Beds located at South Plant.

4.5 MGD, and 1.8 MGD to the south plant. Influent to the north plant can be diverted to the south plant for treatment if so desired.

The digester heat exchangers did not maintain temperatures at the proper level. The heat exchangers will be replaced by larger units in late 1967. The concrete walls of the south plant trickling filters are deteriorating. Repairs are to take place in 1968. Build-up of solids deposition was observed in the chlorine contact basin.

Personnel assigned to the plant consist of a superintendent, one laboratory technician, two operators, and two assistant operators. These men are employed for eight hours per day, five days a week. One man is assigned to work eight hours per day on weekends. Laboratory analyses are performed for BOD, suspended solids, settleable solids, pH, and percent solids. Tests are conducted daily on the influent, effluent, and intermediate points. Coliform analyses are performed periodically by the Weld County Health Department. Records are maintained for the laboratory and for operation and maintenance.

BOD and solids concentrations in the influent from the Monfort Packing Company were above design values. As a result, two primary clarifiers are under construction at the Monfort plant in attempts to lower the organic load to the treatment system.

Analyses of composite samples indicated that the average effluent BOD from the south plant was 29 mg/1, and 37 mg/1 from the north plant; results also show that the average BOD of the combined effluent was less than 25 mg/1. The lower final effluent BOD value could have been the result of a combination of chlorination and solids settling in the contact basin. Operational problems have caused bypassing of some units and/or partial treatment from other units. A tabulation of data is given on pages 74-76.

Although operational difficulties are encountered, concerted efforts are being made to correct these deficiencies. If the installation of clarifiers at the Monfort Packing Company does not alleviate solids settling in the chlorine contact basin, it may be necessary to provide for final clarification of the combined effluent from the two treatment plants.

HILL-N-PARK SANITATION DISTRICT

Type of Treatment:	Secondary-Waste Stabilization Pond
Population Served:	32

The Hill-N-Park Sanitation District sewage lagoon is located about 300 yards north of the South Platte River and 2.5 miles southwest of Evans. The lagoon, completed in February 1967, was not overflowing. A second cell will be provided when the district expands. Surface area of the present lagoon is 2.3 acres.

HUDSON SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 500

The Hudson Sanitation District waste stabilization ponds are located near the northwest corner of the community on the south side of State Highway 52 and discharge effluent via a one-mile outfall to Beebe Seep Canal, RM 314.2-5.4-12.5-4.4-0.03-0.4-10.4. The collection system and two one-acre lagoons were completed in 1957. A third lagoon with a surface area of three acres was added in 1958. The present arrangement of flow control makes parallel operation difficult.

Effluent Data:

Date Time	pH	BOD mg/1	COD mg/1	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/1
6/3/66 0930	7.9	39	149	56	50	<0.1	49,000	33	1.6
6/21/66 1400	8.4	22	140	37	33	<0.1	9,500	1,100	1.3

JOHNSTOWN

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 1000

The Johnstown sewage lagoons are located about one mile east of the community on the north side of State Highway 60 and overflow to the Little Thompson River, RM 260.4-7.0-1.1. The two-cell lagoon system, placed in operation in 1963, has a surface area of 10 acres.

Effluent Data:

Date Time	pH	BOD mg/1	COD mg/1	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/1
6/1/66 1215	6.9	7	24	9	7	<0.1	79,000	2,800	0.2
6/20/66 1500	8.4	24	82	32	26	<0.1	33,000	4,900	0.8

KEENESBURG SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 400

The Keenesburg Sanitation District treatment facilities are located one-half mile south of Keenesburg near an intermittent stream tributary to Lost Creek, RM 226.8-25.5-0.5. The two waste stabilization ponds with a total surface area of 4.5 acres were not overflowing when visited in June 1966.

KERSEY

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 443

The Kersey sewage lagoons are located two miles east of the community on the north side of State Highway 34. Overflow when occurring would enter an intermittent stream, RM 241.4-1.9, flowing to the South Platte River. The lagoon system consists of four ponds with a total surface area of about 1.2 acres. Two of the ponds were built in 1921 and the other two added in 1956. The general condition of the lagoon area was satisfactory and no overflow was observed in June 1966. An additional lagoon was reported in the planning stage.

LA SALLE

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 1200

LaSalle recently completed construction of two lagoons with a surface area of 16 acres, replacing an overloaded septic tank. The ponds are located near the South Platte River, RM 256.7.

MEAD SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 200

The Mead Sanitation District sewage lagoons are located one-quarter mile east of Mead and overflow to an intermittent stream, RM 270.0-4.5-5.8, tributary to St. Vrain Creek. Operation of the two-lagoon system commenced in August 1964. The total surface area is 2.8 acres and the lagoons are designed for parallel or series operation.

Effluent Data:

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
6/1/66 1045	8.6	7.4	63	4	3	<0.1	46,000	700	0.6
6/13/66 1330	9.2	4.2	60	7	7	<0.1	790	130	--

MILLIKEN

Type of Treatment: None
Population Served: 1000

Milliken discharges approximately 70,000 gpd of raw sewage via a sewer collection system to the Little Thompson River, RM 260.4-7.0-0.6. The community has submitted a preliminary engineering report to the State Water Pollution Control Commission.

Effluent Data

Date Time	pH	BOD mg/l	COD mg/l	TSS mg/l	VSS mg/l	Settl. Sol. ml/l	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/l
6/3/66 1200	7.2	258	510	271	221	16.0	17×10^6	2.3×10^6	7.0
6/20/66 1430	7.4	70	239	78	70	4.0	790×10^6	2.0×10^6	5.0

PLATTEVILLE

Type of Treatment: Secondary-Waste Stabilization Pond
Population Served: 700

The Platteville waste stabilization pond is located approximately one-quarter mile west and one-half mile north of the community. When overflowing, the pond would discharge to Independent Ditch, RM 276.8-1.7, an irrigation canal receiving South Platte River water. The 6-acre lagoon was constructed in 1965 and was not overflowing when visited in June 1966.

TRI-AREA SANITATION DISTRICT

Type of Treatment: Secondary-Waste Stabilization Ponds
Population Served: 1600

The Tri-Area Sanitation District serves the communities of Dacona, Evanston, Firestone, and Frederick. The sewage lagoon is located two miles east of U. S. Highway 87 and one-quarter mile north of Firestone. The effluent flows to an irrigation ditch, RM 270.0-17.4-14.1-18.6-0.6-0.8, receiving water from Boulder Creek through the Boulder and Weld Ditch diversion. The 3-cell lagoon, completed in 1956, has a total surface area of 7.5 acres. Pronounced odor was observed and weed growth was excessive. Previous sampling data of the State of Colorado indicate that the system does not produce a satisfactory effluent at all times, particularly during winter and spring. The District is proposing that an additional 10-acre lagoon be constructed in the near future.

Effluent Data: Tri-Area Sanitation District

Date Time	pH	BOD mg/1	COD mg/1	TSS mg/1	VSS mg/1	Settl. Sol. ml/1	Total Coli. /100 ml	Fecal Coli. /100 ml	ABS mg/1
6/3/66 1400	8.2	47	170	93	44	0.2	330,000	1,700	2.1
6/21/66 1115	9.1	32	194	48	39	<0.1	33,000	4,900	2.6

WINDSOR

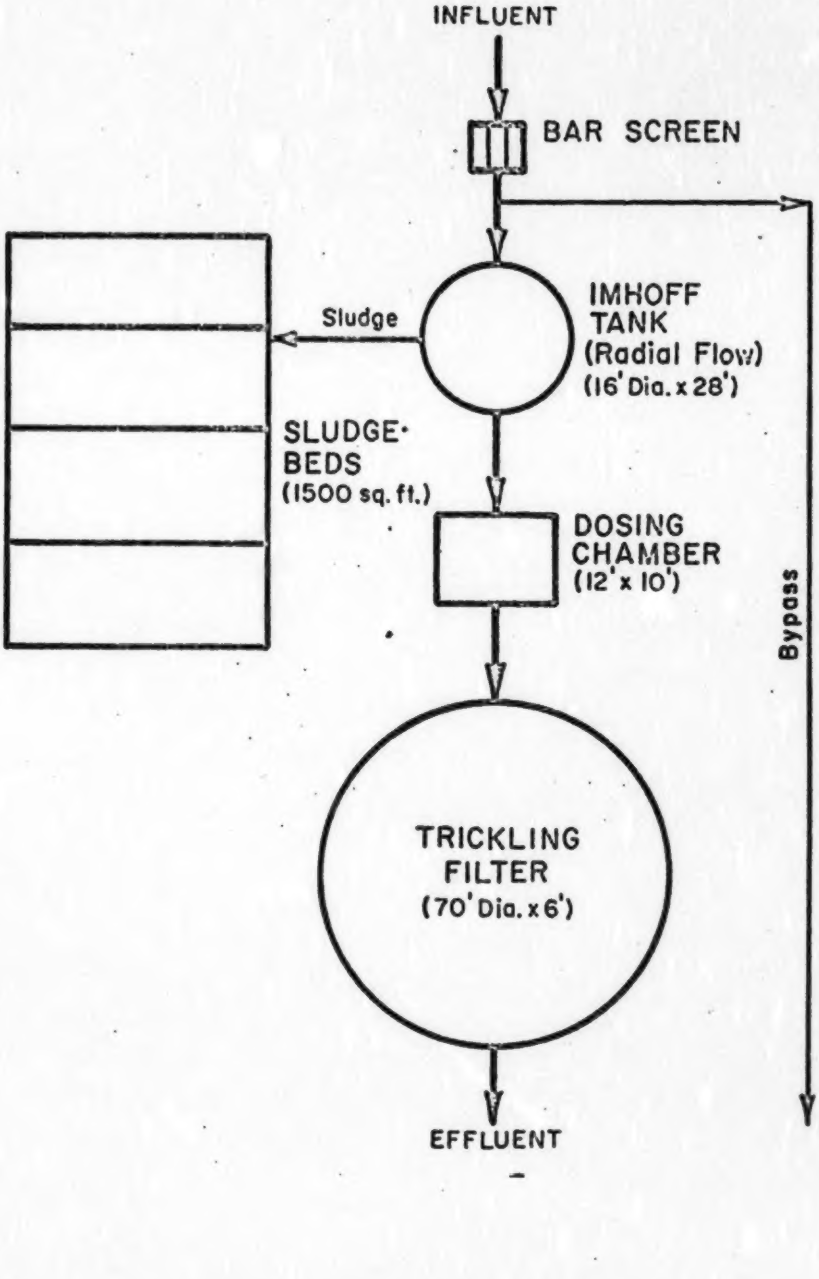
Type of Treatment: Secondary-Imhoff Tank and Trickling Filter
Population Served: 1600

The Windsor sewage treatment plant (see diagram) is located south of the community about one-half mile from Fourth Street and Chestnut Avenue and discharges effluent to the Cache la Poudre River, RM 249.0-26.4. The facility handles an average flow of about 0.128 MGD. The original plant was built in 1936 with numerous additions being made since. A part-time operator devotes about 6 hours per week operating and maintaining the facility. No laboratory analyses are performed. Project sampling data are given in the table on page 82.

SAMPLING DATA
WINDSOR SEWAGE TREATMENT PLANT

Date	Time	Sample Type	Temp °C	pH	BOD mg/l	Cond umhos	TSS mg/l	VSS mg/l	Settl.Sol. ml/l	Total Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	ABS mg/l	NO$_3$N mg/l
EFFLUENT													
8/10/65	0830	Grab	20	7.4	43	1000	66	49	0.5	4,900,000	790,000	--	--
8/10/65	1110	Grab	21	7.4	72	840	25	25	<0.1	4,900,000	3,300,000	--	--
8/10/65	1315	Grab	23	7.6	84	1070	23	23	<0.1	22,000,000	1,100,000	--	--
8/10/65	1450	Grab	21	7.3	130	1215	119	90	2.2	3,300,000	3,300,000	--	--
8/11/65	0900	Grab	19	7.3	95	1060	25	25	0.1	1,100,000	490,000	--	--
8/11/65	1115	Grab	20	7.6	74	963	26	26	0.2	130,000,000	79,000,000	--	--
8/11/65	1400	Grab	21	7.6	68	1010	34	34	0.6	--	--	--	--
8/11/65	1500	Grab	21	7.5	100	1015	38	38	0.5	--	--	--	--
8/11/65	1230	Grab	21	7.4	--	--	--	--	--	790,000,000	79,000,000	--	--
8/11/65	1400	Grab	21	7.5	--	--	--	--	--	7,900,000	1,100,000	--	--
8/12/65	0835	Grab	20	7.2	<18	1230	349	223	1.5	23,000.000	2,200,000	--	--
8/12/65	1115	Grab	21	7.4	28	1100	36	25	0.1	7,000,000	950,000	--	--
8/12/65	1300	Grab	21	7.3	32	942	33	29	0.3	2,800,000	700,000	--	--
8/12/65	1445	Grab	21	7.4	305	895	36	34	0.2	11,000,000	1,300,000	--	--
8/10/65		Comp	--	7.6	105	1030	37	31	<0.1	--	--	--	--
8/11/65		Comp	--	7.6	66	1020	29	28	0.1	--	--	--	--
8/12/65		Comp	--	7.4	34	1040	30	30	<0.1	--		1.4	5.0
Average (Grabs)			21	7.4	<87	1028	68	52	<0.5	7,000,000	1,200,000		
Average (Composites)				7.5	68	1030	32	30	<0.1			1.4	5.0
INFLUENT													
8/10/65	0830	Grab	19	7.5	325	1000	411	357	10.0	--	--	--	--
8/10/65	1100	Grab	20	7.4	255	852	122	107	12.0	--	--	--	--
8/10/65	1320	Grab	22	7.2	400	1490	348	285	10.0	--	--	--	--
8/10/65	1445	Grab	21	7.0	450	950	277	226	14.0	--	--	--	--
8/11/65	0900	Grab	19	7.6	370	1020	362	313	15.0	--	--	--	--
8/11/65	1115	Grab	21	7.4	110	938	218	184	20.0	--	--	--	--
8/11/65	1400	Grab	21	7.4	260	905	166	147	5.0	--	--	--	--
8/11/65	1500	Grab	20	7.5	275	897	216	185	10.0	--	--	--	--
8/12/65	0830	Grab	19	7.8	< 18	1260	145	105	6.5	--	--	--	--
8/12/65	1115	Grab	22	7.3	330	1080	177	134	11.0	--	--	--	--
8/12/65	1300	Grab	21	7.4	205	998	212	172	4.0	--	--	--	--
8/12/65	1445	Grab	21	7.3	36	1010	225	143	8.0	--	--	--	--
8/10/65		Comp	--	7.4	405	1060	291	246	11.0	--	--	--	--
8/11/65		Comp	--	7.7	>130	995	239	187	4.5	--	--	--	--
8/12/65		Comp	--	7.5	220	973	152	116	8.5	--	--	2.3	0.55
Average (Grabs)			20	7.4	>252	1034	240	197	10.4				
Average (Composites)				7.5	252	1009	227	183	8.0			2.3	0.55
PERCENT REMOVALS (Composites)					> 73		85	83	>99				

WINDSOR
SEWAGE TREATMENT PLANT


INFLUENT
BAR SCREEN
IMHOFF TANK (Radial Flow) (16' Dia. x 28')
Sludge
SLUDGE BEDS (1500 sq. ft.)
DOSING CHAMBER (12' x 10')
Bypass
TRICKLING FILTER (70' Dia. x 6')
EFFLUENT

SECTION C-LISTING OF COMMUNITIES AND SANITATION DISTRICTS SERVED BY OTHERS OR BY INDIVIDUAL SYSTEMS

1. Communities and Sanitation Districts Served Totally by Metropolitan Denver Sewage Disposal District No. 1:

Name	County
a. Federal Heights	Adams
b. Northglenn	"
c. North Washington W&SD	"
d. Thornton	"
e. Westminster SD	"
f. Bow-Mar	Arapahoe
g. Sheridan	"
h. Denver	Denver
i. Ft. Logan Mental Health Center	"
j. Lowry Air Force Base	"
k. Applewood	Jefferson
l. Camp George West	"
m. Edgewater	"
n. Federal Youth Center	"
o. Mountain View	"
p. Mount View Girls School	"
q. North Table Mountain SD	"
r. Northwest Lakewood SD	"
s. Pleasant View SD	"
t. Westridge SD	"

2. Communities and Sanitation Districts Providing Secondary Treatment to a Portion of their Wastes with Remainder Discharged to Metropolitan Denver Sewage Disposal District No. 1:

   a. City of Arvada (see page 15)
   b. Baker W&SD (see page 11)
   c. Wheatridge SD (see page 17)

3. Additional Communities Served by Sanitation Districts:

   a. Adams City - served by South Adams W&SD
   b. Commerce City - " " " " "
   c. Dupont - " " " " "

4. Communities Served by Individual Systems:

The following communities did not have sewer collection systems and were served by individual facilities such as septic tanks, cesspools, etc.

Community	County	River Mileage	Population of Community
East Lake	Adams	301.5-4.8W	178
Cherry Hills Village	Arapahoe	325.4-2.0	3200
Allens Park	Boulder	270.0-34.5R-19.4-2.2-0.4	396
Eldora	Boulder	270.0-17.4-32.8L-10.9	546
Hygiene	Boulder	270.0-28.0-0.9N	165
Jamestown	Boulder	270.0-22.6-19.0-2.9	180
Nederland	Boulder	270.0-17.4-32.8L-7.3	458
Niwot	Boulder	270.0-19.9-9.9-0.5W	184
Brookvale	Clear Creek	326.4-29.4	460
Empire	Clear Creek	311.1-47.5-1.1	150
Lawson	Clear Creek	311.1-45.5	150
Silver Plume	Clear Creek	311.1-51.9	90
Parker	Douglas	317.7-24.7-0.8E	156
Sedalia	Douglas	335.5-12.7L-0.1	250
Buffalo Creek	Jefferson	350.8-9.6-0.6	357
Conifer	Jefferson	326.4-8,1-8.3R-9.9-0.8	100
Idledale	Jefferson	326.4-14.7	475
Morrison	Jefferson	326.4-10.8	426
Pine	Jefferson	350.8-13.7	351
Tiny Town	Jefferson	326.4-8.1-7.5	100
Wah-Keeney Park	Jefferson	326.4-20.2-0.6-1.3	300
Bellvue	Larimer	249.0-51.7	300
LaPorte	Larimer	249.0-49.8	200
Timnath	Larimer	249.0-36.3	155
Atwood	Logan	158.0	162
Iliff	Logan	136.9-1.0W	240
Orchard	Morgan	217.1-0.5N	130
Weldona	Morgan	207.0-0.5N	165
Wiggins	Morgan	214.5-9.4	342
Alma	Park	426.2R-36.3	80
Bailey	Park	350.8-26.1	114
Fairplay	Park	426.2R-29.5	390
Sedgwick	Sedgwick	103.1	230
Nunn	Weld	248.2-29.9-2.7W	200
Pierce	Weld	248.2-22.9-3.1W	400